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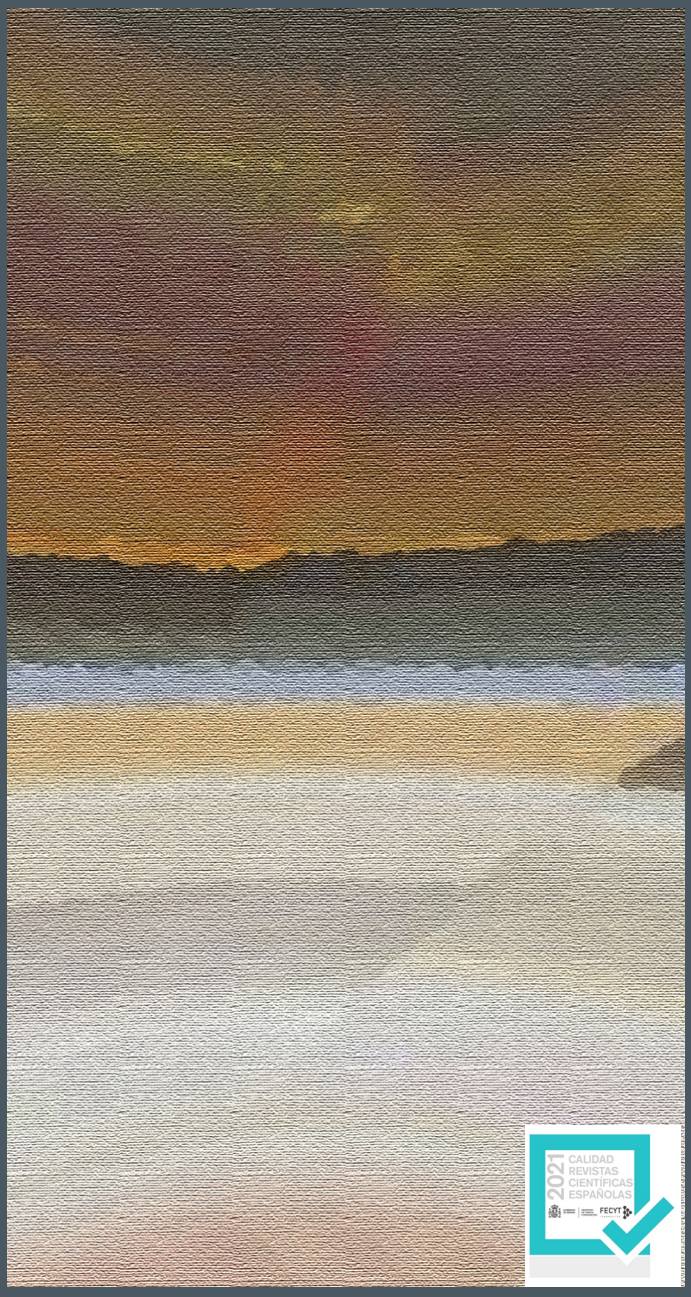

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Presentation

Revista de Educación is a scientific journal published by the Ministerio de Educación, Cultura y Deporte. Founded in 1940, and since 1952 called *Revista de Educación*, it has been a privileged witness of the development of education in the last decades, and an acknowledged means for the dissemination of education research and innovation, both from a national and international perspectives. It is currently assigned to the Instituto Nacional de Evaluación Educativa within the Dirección General de Evaluación y Cooperación Territorial and it is published by the Subdirección General de Documentación y Publicaciones of the Ministerio de Educación, Cultura y Deporte.

Each year we publish four issues. Starting next issue (No. 361), the magazine will have three sections: Research, Essays and Education Experiences, all of them submitted to referees. In the first issue of the year there is also an index of bibliography, and in the second number a report with statistic information about the journal process of this period and the impact factors, as well as a list of our external advisors.

From 2006 to the second number of 2012 (May-August 358), *Revista de Educación* was published in a double format, paper and electronic. The paper edition included all the articles in the especial section, the abstracts of articles pertaining to the rest of sections, and an index of reviewed and received books. The electronic edition contains all articles and reviews of each issue, and it is available through this web page (www.mecd.gob.es/revista-de-educacion/), where it is possible to find more interesting information about the journal. From the 358 number *Revista de Educación* becomes exclusively an online publication.

Revista de Educación assesses, selects and publishes studies framed in well established lines of research, mainly: methodologies of education investigation and assessment; analysis of education systems and public policies; evolution and history of contemporary education systems; education reforms and innovations; quality and equity in education; curriculum; didactics; school organization and management; attention to diversity and inclusive education; educational guidance and tutorship; teacher selection, training and professional development; international cooperation for the development of education.

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***Revista de Educación* does not necessarily agree with opinions and judgements maintained by authors**

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Researchs

Researchs

Does skipping breakfast affect academic performance? Evidence from PISA

¿Afecta al rendimiento académico saltarse el desayuno? Evidencia en PISA

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Abstract

Breakfast has long been believed the most valuable meal of the day, since it has been shown to be an important determining factor of a healthy lifestyle. The aim of this research is to analyze the breakfast habits of 15-year-old students in the Organization for Economic Cooperation and Development (OECD) and to examine whether the positive effects of eating breakfast on health also translate into better levels of academic performance in reading, mathematical and scientific literacy. To this end, we use data from the Program for International Student Assessment (PISA) 2015 round and estimate ordinary least-squares regressions (OLS) applying final student weights and balanced-repeated-replication weights to consider the hierarchical structure of the data. School fixed effects and country fixed effects are also considered in all our estimations. The descriptive analysis shows that in some of the countries participating in PISA 2015 up to a 35% of 15-year-old students reported not eating breakfast before going to school. As for the relationship between eating breakfast and academic performance, our results evidence that eating breakfast before school is associated with higher scores in

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mathematics and science. Based on these results, we consider that it would be advisable to develop policies aimed at encouraging adolescents to eat breakfast, such as school breakfast programs or social network awareness policies, to take advantage of all the benefits that the habit of eating breakfast entails, including the advantages at the academic level demonstrated in this research.

Keywords: academic performance, breakfast, PISA, secondary education, student.

Resumen

Durante mucho tiempo se ha considerado que el desayuno es la comida más valiosa del día, ya que se ha demostrado que es un importante factor determinante de un estilo de vida saludable. El objetivo de esta investigación es analizar los hábitos de desayuno de los estudiantes de 15 años de países miembros de la Organización para la Cooperación y el Desarrollo Económico (OCDE) y examinar si los efectos positivos de desayunar sobre la salud se traducen también en mejores niveles de rendimiento académico en las competencias de lectura, matemáticas y ciencias. Para ello, utilizamos datos de la ronda 2015 del Programa para la Evaluación Internacional de Alumnos (PISA) y estimamos regresiones por mínimos cuadrados ordinarios (MCO) aplicando ponderaciones finales de los alumnos y ponderaciones de repetición equilibrada para considerar la estructura jerárquica de los datos. También se consideran efectos fijos de escuela y efectos fijos de país en todas nuestras estimaciones. El análisis descriptivo muestra que en algunos de los países participantes en PISA 2015 hasta un 35% de los estudiantes de 15 años declararon no desayunar antes de ir al colegio. En cuanto a la relación entre desayunar y el rendimiento académico, nuestros resultados evidencian que desayunar antes de ir a la escuela se asocia con puntuaciones más altas en matemáticas y ciencias. En base a estos resultados, consideramos que sería recomendable desarrollar políticas dirigidas a incentivar a los adolescentes a desayunar, tales como programas de desayunos escolares o políticas de concienciación en redes sociales, para aprovechar todos los beneficios que conlleva el hábito de desayunar, incluyendo las ventajas a nivel académico demostradas en esta investigación.

Palabras clave: rendimiento académico, desayuno, PISA, educación secundaria, estudiante.

Introduction

The Coleman Report (Coleman et al., 1966) introduced the idea of the "educational production function". An education production function considers that the cognitive performance of students is determined by a series of educational factors affecting a student's learning, such as students' characteristics, families, peers, teachers or schools. Among these factors, students' eating habits could play a relevant role. The theoretical basis for the previous assertion lies in the fact that the former literature has shown that there is a relationship between eating habits and cognitive development (Gómez-Pinilla, 2008).

Within the daily meals, breakfast is a meal that a significant percentage of the population continues to skip (see section 4.1), but which previous research has shown to play a positive role in cognitive performance (Widenhorn et al., 2008; Hoyland et al., 2009; Pivik et al., 2012; Wesnes et al., 2012). The aim of this research is to analyze the eating breakfast habits of 15-year-old students and to examine whether eating breakfast before going to the school is associated with students' academic performance in reading, mathematical and scientific literacy. For our research aim, we use data from the Program for International Student Assessment (PISA) 2015 round and estimate ordinary least-squares regressions (OLS) applying final student weights and balanced-repeated-replication (BRR) weights, as well as considering school and country fixed effects.

Our research makes a relevant contribution to the previous literature for various reasons. The first of them is that our study is the first to use international assessments (PISA data) to measure the relationship between breakfast and academic performance. Moreover, our research is novel because it focuses on analyzing the set of OECD countries participating in PISA 2015. Up to date, previous studies (see section 2) that have analyzed this relationship have been based on very particular contexts of specific regions, which in many cases, considering the techniques employed, limits the validity of the results. Our research aims to overcome these limitations by having a large number of observations and being able to evaluate different regions and countries. The consideration of all OECD countries is possible given that PISA works with standardized competence tests and allows the comparison between the participating countries. In addition, our research is also novel because we conduct an analysis by competences (reading, mathematical and scientific

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literacy), i.e., we want to study whether eating breakfast has an impact on academic performance and if so, whether this is more pronounced in some competences.

Our results show that eating breakfast before school is associated with higher scores in mathematics and science, while being not statistically significant in reading. Moreover, we find that the association is stronger for mathematics than for science. According to our findings, we consider it necessary to consider breakfast as an essential meal in adolescents and we suggest that it would be advisable to develop programs that promote breakfast (breakfast at school and awareness policies on social networks), especially in those countries where a high percentage of students still do not eat breakfast before going to school.

The remainder of this paper is organized in the following manner. In section 2, we provide an overview of previous studies that have analyzed the relationship between eating breakfast and academic performance. Section 3 then describes the PISA 2015 database and the variables included in our models, as well as the methodological approach. Section 4 presents the results of the descriptive analysis regarding breakfast eating habit across countries and of the analyses on the relationship between eating breakfast and academic performance. Finally, section 5 concludes with conclusions and reflections on the results, as well as possible routes for further research.

Literature review

The following is a review of the previous literature that analyses the relationship between eating breakfast, cognitive development and academic performance of children and teenagers at school age. So far, previous research shows a positive association between eating breakfast and students' cognitive function mainly based on laboratory experimental studies (Hoyland et al., 2009). In this regard, Widenhorn et al. (2008) ran an experiment with 104 American students between 13 and 20 years of age and found that eating breakfast has positive effects on students' cognitive function and attention in the short-term. In the same line, Wesnes et al. (2012) analyzed 1,386 UK students aged 6-16 years and also observed that those who had eaten breakfast showed superior performance on attention and memory tests. In the USA, Pivik

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et al. (2012) recruited 116 children between 8–11 years old and found that when children eat breakfast, neural network activity involved in processing numerical information is functionally improved. Therefore, the previous studies show that breakfast appears to have a positive effect on cognitive activity.

If we consider the results of the previously mentioned studies and conclude that eating breakfast leads to an improvement in attention and cognitive performance, it is to be expected that this is also reflected in a better academic performance of the student, especially if the habit of eating breakfast is continuous throughout the academic year. In this regard, we find several previous studies that have analyzed the direct relationship between breakfast and academic performance measured either through school grades or standardized test scores (Adolphus et al., 2013). In this line of research, Kim et al. (2003) collected data about eating habits from 6,463 boys and girls (10–17 years) in Korea and found that the grade point average (GPA) of students was strongly associated with dietary behaviors, including the frequency of breakfast consumption. In Oslo (Norway), Lien (2007) collected data from all junior high schools and found that skipping breakfast was a common feature among adolescents aged 15–16 and had negative implications on mental distress and school grades. Similarly, Gajre et al. (2008) collected data from 379 students aged 11–13 in India and found that the regular habit of eating breakfast, as opposed to irregular consumption or skipping breakfast, leads to significantly higher grades in science and English. In Spain, Fernández-Morales et al. (2008) did a nutritional study on the breakfast quality of 467 students aged 12-17 and found that students who habitually ate breakfast were more likely to achieve higher school grades than those skipping it. In a similar line, Edwards et al. (2011) used data from 800 sixth graders in a Midwest city school district in the United States and found that those students who ate breakfast 5 days or more per week obtained higher mean scores in mathematics (Measure of Academic Progress test) than those who ate breakfast 4 days or less, while no association was found for reading. In the Netherlands, Boschloo et al. (2012) used data from 605 students aged 11-18 years and also found that students who reported skipping breakfast twice or more times per week, had lower end-of-term grades and more self-reported attention problems. This positive association between breakfast and academic performance was also found by O'Dea and Mugridge (2012) in Australia. The authors

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analyzed 824 children aged 8–13 years and found that eating breakfast and the nutritional quality of breakfast significantly predicted NAPLAN (National Assessment Program—Literacy and Numeracy) literacy school grades. So (2013) analyzed data from 75,643 adolescents aged 12–18 year in Korea and also found that frequency of breakfast consumption was positively correlated with academic performance.

More recently, Littlecott et al. (2016) carried out a research with 3,093 students in Wales (aged 10-11 years) and found significant associations between eating breakfast and better scores on Key Stage 2 Statutory Assessment Tests. Vishnukumar et al. (2017) also found a significant difference in the grades obtained between breakfast skippers and breakfast non-skippers. Specifically, the authors found that students aged 11-16 who do not eat breakfast score worse, based on an analysis of 195 students in Sri Lanka's Batticaloa district. In Canada, Sampasa-Kanyinga and Hamilton (2017) analysed a sample of 10,272 students aged 12-18 years and also found that students who ate breakfast on all five days were more likely to obtain higher school grades. In the same line, Masoomi et al. (2020) ran a cross-sectional study in Iran with 600 students in the first grade of high school and found that breakfast meal had a significant positive effect on academic performance. The most recent studies in this area date from 2021 and also find a positive association between eating breakfast regularly and academic performance levels. Specifically, Lee et al. (2021) analysed data from 835 children aged 6-12 years in China and found that eating breakfast regularly was associated with higher levels of academic achievement. Similar analysis were conducted in Chile with 1,181 adolescents aged 10-14 (Peña et al., 2021) and in Singapore with 82 adolescents (Kawabata et al., 2021), which also found positive effects of eating breakfast on academic performance.

While, on the basis of the above-mentioned studies, there seems to be consensus on the positive impact of breakfast on academic performance, previous studies face some limitations that we are trying to overcome in this research. In this sense, many of the studies we have cited use a very limited sample of participants (Gajre et al., 2008; Fernández-Morales et al., 2008; Edwards et al., 2011; Boschloo et al., 2012; O'Dea and Mugridge, 2012; Vishnukumar et al., 2017). Considering that a study's statistical power is directly related to the sample size and that most of the commonly used statistical methods rely on assumptions that are less likely to be satisfied under small samples (Morgan, 2017), the robustness

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of many of the results obtained by the previously described studies could be improved by using larger samples, as in the case of our research. Furthermore, most of the mentioned studies analyze the impact of eating breakfast on student school grades. However, in our research, instead of using school grades, we use data from PISA, a standardized achievement test. This makes our research the first paper to study the relationship between eating breakfast and academic performance measured through PISA results. As the PISA tests are designed to be independent of the curriculum and measure students' competences and their ability to cope with real-life problems, using these data allows us to include in our estimates all countries participating in the PISA tests and to be able to work with a large sample size. In addition to allowing us to work with a large sample size, using PISA data implies using data from one of the most well-known and best executed educational assessments in the world and that is taken into consideration by most governments when making educational policy decisions. Therefore, we believe that our research contributes to the previous literature by providing new empirical evidence with a large sample of students and making use of one of the most important databases in education, not analyzed so far for the study of the relationship between breakfast and academic achievement.

In addition to the novelties previously mentioned, we consider that it is still necessary to provide additional empirical evidence on this issue given that, as shown in section 4.1 of this paper, there is still a high percentage of students in the OECD who do not eat breakfast before going to school. Therefore, we consider it necessary to add new empirical evidence that can help convince policy makers of the importance of considering breakfast as a determining factor of academic performance.

Data and Methodology

Program for International Student Assessment (PISA)

This research uses data from PISA, an assessment programme that aims to assess the extent to which students near the end of compulsory education have acquired some of the knowledge and competences necessary for full participation in society. All OECD member countries participate in the study, as well as some partner countries. In the PISA 2015 wave a total

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of 519,334 students from 73 regions participated. Detailed information about the PISA test can be found on the website: https://www.oecd.org/pisa/.

PISA tests are conducted every three years and are taken by 15-year-old students in various key subject areas (mathematics, science and reading). In addition to the tests of competences, students, teachers, and schools answer contextual questionnaires that allow research such as this to be carried out and to link different factors in the student's environment to his or her academic performance. The test was first conducted in 2000 and the latest results available are for 2018. However, in this research we work with data from PISA 2015, given that it is the most recent round in which we find information on whether or not students eat breakfast before going to school.

The selection process for students participating in PISA has two stages: (1) first, public and private schools in the various countries are randomly selected, with a minimum of 150 schools per country; (2) then a minimum of 5,400 15-year-old students per country from the selected schools are selected. This sample selection process guarantees the representativeness of the sample. However, the hierarchical structure of the data makes it indispensable to use methodologies that consider the multilevel structure when performing statistical analyses, in order to obtain robust results.

Variables

Dependent variables

Our research aims to analyze the relationship between eating breakfast and academic performance. We measure academic performance with PISA scores, so the dependent variables in our analysis are the scores obtained by the students in the tests of the three following competences evaluated in PISA: mathematics, science and reading.

Mathematical competence analyses the student's capacity to formulate, use and interpret mathematics in different situations. It comprises reasoning mathematically and applying mathematical notions, methods, facts, and tools to define and predict events (OECD, 2015). The competence in reading comprehension assesses the student's ability to comprehend,

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use and analyze critical texts so as to accomplish their personal objectives, develop their chances and understanding and contribute to society (OECD, 2015). Finally, the competence in science analyses students' skills in dealing with scientific issues and ideas. According to PISA, a scientifically literate individual is someone who is willing to speak out about science and technology in a reasoned way (OECD, 2015). The scores obtained by the students in the tests of the different competences are scaled so that the OECD average in each competence is 500 and the standard deviation is 100 (OECD, 2015).

The PISA tests are designed on the basis of the use of different sets of items and various assessment models. In this way, each student is confronted with a subset of items from the available set. This design makes it necessary to use scaling techniques in order to establish a common scale for all students. To this end, in PISA 2015 the average scores for the three competencies assessed are estimated using the item response theory (IRT). IRT uses statistical models to predict the probability of responding correctly to an item. It does this by establishing response patterns and predicting this probability by considering the student's responses to other items. Thanks to the application of this methodology, the performance of students in the different competences is comparable and can be measured on the same scale, regardless of the fact that each student has been administered different items. Given that each student completed only a subset of items, the scores were estimated as plausible values. Specifically, ten plausible values are estimated for each student in each competence. These values represent the distribution of potential scores for all students with similar characteristics and the same patterns of item response (OECD, 2015). In our estimations, we have decided to use of all ten plausible values available in PISA 2015 as according to OECD (2017) it is the best estimate for a student's ability.

Independent variable: "Breakfast before going to school"

In PISA 2015, students are asked to report whether they eat breakfast before going to the school *("Before going to school did you: Eat breakfast")* with the answer choices being: no or yes. Although PISA 2015 questionnaire does not provide any information about the specific diet students may follow, the information about if students eat breakfast or

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not before going to school allows us to obtain some first relevant results on this potential association that should of course be complemented with future research that also considers the quality of the breakfast. Therefore, the dependent variable used in this research is a dichotomous variable hereafter called "Breakfast before going to school" which takes values 0 (the student did not have breakfast before going to school) and 1 (the student did have breakfast before going to school).

We find it necessary to indicate that the PISA estimates on eating breakfast may overestimate the actual number of students skipping breakfast. This can be explained by the fact that some students might decide to have breakfast when they arrive at school. However, since the questionnaire only asks if students had breakfast before going to school, some students who eat breakfast at school might answer "no" and would count as students who skipped breakfast, when in fact they did not. Nevertheless, we do not expect this to have much impact on our data given that, with the exception of the School Breakfast Program in the United States, programs advocating school breakfast are rare in most countries participating in PISA. Even in the United States, where this program has been in place for years, only about 4% of students participated in this program last year. Bearing this in mind, we do not expect overestimation in this variable to be a problem that biases our results.

Control variables

To properly measure the relationship between eating breakfast and academic performance, confounding variables must be controlled. In this research, we have made used of different control variables that previous literacy has shown to be relevant to explain academic performance and that are asked in PISA 2015.

At the student level we use as control variables the gender, the index of economic, social and cultural status (ESCS), the index of immigration status (native, second generation or first generation), the repetition of a grade and the starting age of International Standard Classification of Education (ISCED) level 0. ESCS is a composite score built by: (1) indicator of parental education; (2) highest parental occupation; (3) and home possessions including books.

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We control for the student gender as research to date has reported a gender gap in academic success, with boys falling behind girls (Clark et al., 2008; Parker et al., 2018). Regarding the inclusion of the ESCS, the meta-analysis conducted by Sirin (2005) evidences a strong relationship between the socioeconomic status and academic achievement. We also consider the migration status to be a relevant factor affecting academic achievement. According to current research, immigrants are typically at a disadvantage compared with natives in terms of academic performance (Makarova and Birman, 2015; Borgna, 2016). As for the repetition of a grade, Allen et al. (2009) examine the effect of grade retention on academic outcomes and conclude that there is a negative effect of grade repetition on academic outcomes. Finally, regarding the starting age of ISCED 0, research evidence suggests that students that have been exposed to pre-school education prior to their entry into the regular school system out-perform their counterparts without such experience (Meyers, 1992; Taiwo et al., 2002).

At the school level, we control for: (1) class size; (2) school ownership (public, semi-private or private); (3) school location; and (4) the average index of economic, social and cultural status of students in the school. The inclusion of class size is relevant since previous research has found a statistically significant negative effect of class size on academic achievement (Heinesen, 2010; Krassel and Heinesen, 2014). On the other hand, the ownership of the educational institution has also been shown to be a determining factor in academic performance (Lubienski and Lubienski, 2006; Boulter, 2017; Sakellariou, 2017). As for the school location, previous research has also shown that urban students tend to perform better than rural students (Alordiah et al., 2015). Finally, we have included the average ESCS of students in school as a proxy of the peer effect (Dannemann, 2019).

The definition of the categorical variables and the main descriptive statistics of all the variables used in this research are shown in tables A.I and A.II in the Appendix. Additionally, it is important to mention that the correlation between all the variables included in the estimates has been checked and it has been confirmed that in no case there are correlation coefficients greater than 0.3.

Methodology

Regarding the methodological approach followed in this research, first of all it is necessary to highlight that survey weights are required to analyze PISA data, to calculate proper estimations of sampling error and to make valid estimations and inferences of the population (OECD, 2015). As explained in section 3.1, the students participating in PISA were chosen randomly but the selection probabilities of the students vary. Therefore, in our estimations we incorporate survey weights to ensure that each sampled student properly represents the precise number of students in the full PISA population. Specifically, each student was assigned a weight that was defined by the reciprocal of the student's sample selection probability. In each step of our estimations, we apply the student weight for student j in school i proposed by OECD (2015) that consists of: (1) two base weights, the school base weight (the reciprocal of the probability of inclusion of school i into the sample) and the within-school base weight (the reciprocal of the probability of selection of student j from within the selected school i); (2) and five adjustment factors to compensate for: (i) non-participation by other schools that are rather comparable to school; (ii) for schools in some participating countries where only 15-year-old students who were enrolled in the modal grade for 15-year-old students were included in the test; (iii) for non-participation by students within the same school non-response cell and explicit stratum; (iv) to reduce unpredictably large values of the school base weight; (v) and to decrease the weights of students with remarkably large values for the product of all the previous weight components. All the results presented in this paper (both descriptive statistics and regressions) have been obtained using the corresponding weighting variables.

As explained previously, the PISA tests have a multilevel hierarchical structure, since students are nested into schools and schools are nested into countries. In order to obtain valid estimates, it is necessary to take this multilevel structure into account and account for divergences between schools and between countries. There are two options for considering this structure: resampling procedure and multilevel modeling. In this research we apply a resampling procedure by using the replicated weights provided in the PISA database together with the final weights at the student level and including country-fixed effects. Replicate weight techniques are believed to yield unbiased parameters by using numerous

subsamples to determine the parameter in each one and estimate the sampling variance as from the variability of the parameter among the various samples and the estimate for entire sample.

Specifically, we have estimated the Ordinary Least Squares (OLS) model presented in equation (1) using the statistical software Stata and applying final student weights and balanced-repeated-replication (BRR) weights though the command *repest (*Avvisati and Keslair, 2014*):*

$$Y_{ijk} = \alpha + \beta B_{ijk} + \delta X_{ijk} + \lambda Z_{jk} + \varepsilon_{ijk} \quad (1)$$

Where denotes the score achieved by student "i" at school "j" in country "k". As mentioned in section 3.2, we use all the plausible values in our analysis in order to produce consistent standard errors. Therefore, the estimates of our principal models are derived from computing average estimates of each parameter obtained in regression models on plausible value scores. B_{ijk} is the answer of student "i"" to the question "*Before going to school did you: Eat breakfast"* ; X_{ijk} refers to a set of control variables related to socio-demographic characteristics of student "i" (gender, ESCS, index of immigration status, repetition of a grade, the starting age of ISCED 0), Zj_k represents a set of control variables related to school characteristics (class size, school ownership, school location, average school ESCD) and ε_{ijk} represents the individual error term. School fixed effects and country fixed effects are considered in all our estimations to control for the correlation between the values of the school variables of students from the same school and for systematic cultural and institutional differences at the country level.

Results

Descriptive analysis

Table I shows the frequency distribution of the answers for the question "*Before going to school did you: Eat breakfast*" in each of the participating countries in PISA 2015. The results are displayed from highest to lowest percentages of students skipping breakfast.

TABLE I. Answers for "Before going to school did you: Eat breakfast". Frequency distribution by country: PISA 2015

Jurisdiction	No (%)	Standard Error	Yes (%)	Standard Error	Number of observations
Austria	35.83	0.85	64.17	0.85	6,420
Slovenia	34.52	0.66	65.48	0.66	6,007
Singapore	34.34	0.59	65.66	0.59	6,022
Hungary	30.75	0.84	69.25	0.84	4,975
Chile	30.28	1.13	69.72	1.13	6,191
Slovak Republic	29.93	0.79	70.07	0.79	5,789
Czech Republic	29.60	0.65	70.40	0.65	6,556
Germany	29.30	0.73	70.70	0.73	3,299
United Kingdom	28.91	0.68	71.09	0.68	13,205
Israel	28.56	0.94	71.44	0.94	6,260
United States	28.26	0.66	71.74	0.66	5,436
Croatia	27.89	0.87	72.11	0.87	5,568
Switzerland	27.76	1.53	72.24	1.53	4,771
Bulgaria	26.42	0.80	73.58	0.80	4,825
Italy	25.94	0.75	74.06	0.75	10,955
Luxembourg	25.32	0.87	74.68	0.87	4,746
Canada	25.15	0.62	74.85	0.62	18,820
United Arab Emir	24.66	0.72	75.34	0.72	13,087
Brazil	24.23	0.58	75.77	0.58	12,757
France	23.69	0.57	76.31	0.57	5,547
Qatar	23.13	0.47	76.87	0.47	10,028
Australia	22.06	0.69	77.94	0.69	12,242
Belgium	21.55	0.40	78.45	0.40	8,622
Greece	21.36	0.43	78.64	0.43	5,303
Korea	21.17	0.82	78.83	0.82	5,519
Turkey	20.90	0.50	79.10	0.50	5,637
Lithuania	20.89	0.62	79.11	0.62	6,094
New Zealand	20.73	0.63	79.27	0.63	4,081

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Poland	20.24	0.73	79.76	0.73	4,403
Costa Rica	19.97	0.60	80.03	0.60	5,416
Iceland	19.60	0.75	80.40	0.75	3,103
Mean participating countries	19.54	0.17	80.46	0.17	399,840
Latvia	19.39	0.61	80.61	0.61	4,695
Uruguay	19.09	0.56	80.91	0.56	4,874
Mexico	18.98	0.64	81.02	0.64	6,620
Norway	18.85	0.74	81.15	0.74	5,075
Tunisia	18.30	0.74	81.70	0.74	4,371
Estonia	17.95	0.53	82.05	0.53	5,424
Finland	17.61	0.61	82.39	0.61	5,486
Hong Kong	17.35	0.60	82.65	0.60	5,247
Ireland	17.08	0.63	82.92	0.63	5,531
Sweden	16.97	0.63	83.03	0.63	4,849
Denmark	16.61	0.61	83.39	0.61	6,179
Dominican Republic	16.50	0.52	83.50	0.52	3,541
Spain	15.42	0.55	84.58	0.55	6,427
Chinese Taipei	15.39	0.83	84.61	0.83	7,685
Colombia	15.17	0.32	84.83	0.32	10,872
Thailand	14.93	0.47	85.07	0.47	7,927
Macao	13.22	0.63	86.78	0.63	4,466
Russian Federation	13.16	0.47	86.84	0.47	5,578
Netherlands	12.69	0.49	87.31	0.49	5,151
Montenegro	11.57	0.43	88.43	0.43	4,950
Peru	11.57	0.53	88.43	0.53	5,481
Japan	11.18	0.52	88.82	0.52	6,530
Portugal	10.35	0.47	89.65	0.47	7,103
B-S-J-G (China)	9.82	0.54	90.18	0.54	9,763

Source: Own elaboration with PISA 2015 data.

As can be seen, we obtain a wide range of average values that suggests important differences in eating breakfast habits in the PISA countries. At the lower end we have countries such as Austria, Slovenia and Singapore, where we observe that still around a 34-35% of the 15-year-old population reported not eating breakfast before going to school. At the other extreme, we find jurisdictions such as Beijing, Shanghai, Jiangsu, and Guangdong (B-S-J-G, China), Portugal or Japan where only 6-7% of students reported not eating breakfast before going to school. If we look at the average values for all the countries participating in PISA, we see that 19.54% of the total number of students who participated in the test reported not eating breakfast before going to school.

Based on these results, we believe that it is evident that there are still many students who do not eat breakfast before going to school and that further research is needed on the impact this may have on academic performance. The results obtained in the OLS estimates research will allow us to be in a position to make recommendations for educational policy in this regard.

OLS models

This section presents the main results of the estimated OLS models with school and country fixed effects. According to the results reports in Table II, we find a positive association between eating breakfast and students' test scores in mathematics and science, while in reading no statistically significant association is observed. If we look at the magnitude of the coefficients, we can conclude that the relationship seems to be somewhat higher in mathematics than in science. Reflections on these results are presented in section 5.

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TABLE II. Estimates for the association between eating breakfast and academic performance: PISA 2015.

VARIABLES	(1) Mathematics	(2) Reading	(3) Science
Breakfast before going to school	9.546***	-0.563	3.274***
	(1.175)	(1.135)	(0.999)
Controls			
Gender (female)	-15.19***	16.51***	-10.99***
	(0.890)	(0.976)	(0.930)
Starting age ISCED 0	-1.137***	-0.785*	-0.198
	(0.395)	(0.423)	(0.379)
Grade repetition	-53.65***	-55.51***	-52.13***
	(1.781)	(1.757)	(1.691)
Immigration status	-6.784***	-4.726***	-6.732***
	(1.379)	(1.705)	(1.381)
ESCS	11.67***	11.86***	12.50***
	(0.471)	(0.538)	(0.457)
Class size	1.127***	0.775***	1.020***
	(0.131)	(0.118)	(0.124)
School Ownership	-8.274***	-6.457***	-7.570***
	(2.653)	(2.208)	(2.388)
School Location	2.287***	0.305	2.692***
	(0.837)	(0.767)	(0.757)
ESCS school	42.14***	44.23***	45.55***
	(1.373)	(1.249)	(1.229)
Constant	480.0***	483.1***	494.4***
	(3.537)	(3.335)	(3.251)
R-Squared	0.247***	0.284***	0.273***
	(0.00655)	(0.00666)	(0.00596)
Observations	275,507	275,507	275,507

* Standard errors in parenthesis. Significance levels: ***p<0.01, **p<0.05, *p<0.1.

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While our focus is on the influence of breakfast on academic performance, other parameters in the estimates are also statistically significant and are in line with previous literature. In this sense, we find that most of the coefficients for the control variables included in our regressions are statistically significant. Specifically, we find that test scores in mathematics and science are clearly higher for boys, while in reading are higher for girls. We also find that students who earlier attended pre-primary school get better marks in mathematics and that in all the competences higher levels of ESCS are associated with better test scores. Likewise, we find a strong negative relationship for all the competences between repeating a grade, being immigrant and academic performance. With regard to the control variables at the class and school level, we find a positive and significant relationship for the class size, size of the city/region where the school is located and the socioeconomic characteristics of schoolmates.

Concluding remarks

The results of this research lead to two main conclusions: (1) the descriptive analysis showed that there is still a high percentage of students in many OECD countries who do not eat breakfast before going to school; and (2) the econometric analysis showed that there is a positive association between breakfast and academic performance in mathematics and science. With these two conclusions in mind, we believe it is particularly pertinent to make recommendations to policy makers. This is relevant given that, on the basis of the empirical evidence shown in this research, those countries with high percentages of students who skip breakfast would benefit, in terms of academic performance, if they were able to reduce these rates.

In order to make appropriate recommendations to policy makers to reduce the percentage of students skipping breakfast, it is first necessary to know what causes young people to decide whether or not to eat breakfast. These causes are not investigated in this article, but previous studies have focused on them and are referenced below. In this sense, research up to date has shown that students living in families that enjoy higher family functioning (e.g., communication, closeness, problem solving, behavioral control) are more likely to eat breakfast before school

(Berge et al., 2013). Additionally, research has also shown that a higher socio-economic status is positively associated with eating breakfast before school (Hussein, 2014; Chen et al., 2018). Considering the second of these causes, the socio-economic level, we believe that one appropriate recommendation would be to implement breakfast programs in schools. Implementing such programmes is a way to ensure that children and adolescents from households where socio-economic status is one of the reasons why students do not eat breakfast, have the opportunity to enjoy this meal and thus improve their academic performance levels. An example of the success of these type of programmes is the "School Breakfast Program" in the United States. This program, which began in 1966, has lasted until today and has fundamentally improved the nutrition and dietary needs of children in low income families and with working parents. Since these type of policies are designed to respond to the needs of the neediest households, we also believe that it would be necessary to develop parallel campaigns (for example on social networks) to raise awareness of the importance of breakfast. In this way, those students who do not meet the characteristics to join school breakfast programmes but often skip breakfast for other reasons, may also realize the importance of eating breakfast and change their eating habits. Furthermore, we believe that schools, in addition to the measures taken by public administrations, could also raise awareness of the importance of breakfast among children and adolescents. In this sense, tutorial action could play a key role.

Although our results provide empirical evidence to the scientific debate and are novel for the reasons explained in the introduction of this article, we consider that there are still some limitations that could be overcome and which justify the need for further research on this topic. In this respect, we consider that it would be especially relevant to carry out natural experiments in those countries where there are still high percentages of students who do not eat breakfast before going to school. In this way, a causal relationship could be confirmed. However, given the difficulties in carrying out this kind of experiments with a sufficient sample to validate the results, this research sheds light on the positive relationship between eating breakfast and academic performance and makes recommendations to promote breakfast among children and adolescents.

Even if this research focused on analyzing the benefits of eating breakfast on academic performance, we would like to point out that

potential advantages of eating breakfast go beyond the academic scope and it has been demonstrated that eating breakfast has an important positive influence on factors such as health, mood states, self-regulation and self-esteem (Birch et al., 2007; Cooper et al., 2011). Therefore, the recommendations put forward in this research would not only improve academic performance but based on previous studies, would also have other beneficial effects on children and adolescents. In summary, we believe that the results achieved in this research - based on empirical evidence from a prestigious database such as PISA and using a large number of observations - can serve as a reference for policy makers to develop campaigns and policies aimed at making breakfast a fundamental meal that no child or adolescent skips before starting the school day.

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Appendix

TABLE A.I. Definition of the categorical independent and control variables.

	Categories
Independent variables	
Breakfast before going to school	0=No 1=Yes
Control variables at student level	
Gender (female)	0=male 1=female
ISCED 0	0=1 year or younger 1=2 years 2=3 years 3=4 years 4=5 years 5=6 years or older 6=I did not attend <ISCED 0>
Repeater	0=No, never 1=Yes, once or more
Immigrant status	0=Native 1=Second-Generation 2=First-Generation
Control variables at school level	
School ownership	0=Public school 1=private government dependent 2=Private
School location	0=A village, hamlet or rural area (fewer than 3 000 people) 1=A small town (3 000 to about 15 000 people) 2=A town (15 000 to about 100 000 people) 3=A city (100 000 to about 1 000 000 people) 4=A large city (with over 1 000 000 people)

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TABLE A.II. Descriptive statistics of the dependent, independent and control variables*

	Observations	Mean	Std. Deviation	Min.	Max.
Dependent variable					
PV1MATHS	275,507	480.31	97.90	65.85	870.51
PV1READING	275,507	484.82	98.29	0	882.12
PV1SCIENCE	275,507	485.23	97.64	108.99	888.36
Independent variable of interest					
Breakfast	275,507	0.80	0.40	0	1
Control variables at student level					
Gender (female)	275,507	0.53	0.50	0	1
ISCED 0	275,507	2.68	1.43	0	6
Repeater	275,507	0.13	0.34	0	1
Immigrant status	275,507	0.19	0.53	0	2
ESCS	275,507	-0.20	1.08	-7.26	3.96
Control variables at school level					
Class size	275,507	28.40	9.20	13	53
School ownership	275,507	0.30	0.62	0	2
School location	275,507	2.22	1.18	0	4
School ESCS	275,507	-0.21	0.73	-4.02	1.54

* The descriptive statistics are calculated for the subsample of students participating in PISA who have information for all the variables included in our OLS estimations.

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Determinants of academic achievement: systematic review of 25 years of meta-analyses[1]

Condicionantes del rendimiento académico: revisión sistemática de 25 años de meta-análisis

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Abstract

This work is a continuation of the review carried out by Sipe and Curlette (1997), which synthesized the results of 103 meta-analyses published between 1984 and 1993 aimed at studying the variables that influenced academic performance. Knowing the aspects that enhance or hinder students' academic performance is key to improving it. Therefore, in this paper we perform a review of 80 meta-analyses published between 1994 and 2019 with 127 effect sizes that have analyzed the relationship between personal, family, school and teacher variables and students' academic performance. The results provide an overview

[1] This research has been conducted under the support of the *Ayudas para la Formación de Profesorado Universitario* (FPU).

of the characteristics of the meta-analyses identified in relation to their search process, the selection and coding of the primary studies, their methodology, and the characteristics of the selected studies. Also, an estimate of the effect size of each of the determinants of academic performance is calculated from the 127 effect sizes distributed by these meta-analyses. The above shows that the personal variables that have the greatest influence on academic performance are prematurity, student's previous performance, intelligence, and health. Among the family factors, the absence of the father, mistreatment received by the family environment and socioeconomic status stand out. The school aspects that have shown the greatest weight on students´ results are classroom climate, measures to reduce misbehavior and school organization. Finally, among the variables associated with the teacher, the teachers´ own characteristics, their relationship with the students and the quality of teaching have demonstrated to be the most important. For all these reasons, the review conducted in this paper in relation to the determinants of academic performance will facilitate the adoption of better decisions when addressing its improvement.

Key words: Academic achievement, Academic failure, Systematic review, Meta-analysis, Meta-synthesis

Resumen

Este trabajo supone una continuación de la revisión realizada por Sipe y Curlette (1997), en la que se sintetizaron los resultados de 103 meta-análisis publicados entre 1984 y 1993 destinados a estudiar las variables que influían en el rendimiento académico. Conocer los aspectos que potencian o dificultan el rendimiento académico de los estudiantes resulta clave para poder favorecer su mejora y, por ello, en este estudio se realiza una revisión de los meta-análisis publicados entre 1994 y 2019 que han analizado la relación entre variables personales, familiares, escolares y docentes y el rendimiento académico del alumnado. Los resultados proporcionan una visión general de las características de los 80 meta-análisis identificados en relación con su proceso de búsqueda, selección y codificación de los estudios primarios, el procedimiento metodológico seguido y las características de los estudios primarios seleccionados. Asimismo, a partir de los 127 tamaños del efecto reportados por estos meta-análisis, se estima un tamaño del efecto global para cada uno de los condicionantes del rendimiento académico. Lo anterior permite observar cómo las variables personales que ejercen una mayor influencia en el rendimiento académico son la prematuridad, el rendimiento previo del alumnado, su inteligencia y su salud. Entre los factores familiares destacan la ausencia del padre, el maltrato recibido por parte del entorno familiar y el estatus socioeconómico. Los aspectos escolares que han demostrado tener un mayor peso sobre los resultados de los estudiantes han sido el clima del aula, las medidas de reducción del mal comportamiento y

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la organización escolar. Por último, entre las variables asociadas al profesor destacan sus propias características, su relación con los estudiantes y la calidad de la docencia. Por todo ello, la presente revisión contribuye a identificar los principales condicionantes del rendimiento académico, lo cual facilitará la adopción de decisiones adecuadas a la hora de abordar su mejora.

Palabras clave: Rendimiento académico, Fracaso escolar, Revisión sistemática, Meta-análisis, Meta-síntesis

Introduction

While deepening in the concept of academic achievement may seem a simple task due to its familiarity, this term encompasses a great complexity both in its definition and in its evaluation (Bentley, 1966; Stevenson, 2021; York et al., 2015). Said complexity is not only due to the fact that academic achievement can cover a wide range of educational outcomes, ranging from the acquisition of a diploma to the students' moral development (York et al., 2015), but also to its relation to some elements that are difficult to quantify (Mozammel et al., 2021). Moreover, the term academic achievement has a number of interchangeable expressions –such as academic performance or academic success– that make its definition and operationalization even more complex worldwide (Stevenson, 2021). In addition, the ambiguity that characterizes academic achievement is also related to the different perspectives from which success, in general, can be approached (Kumar & Lal, 2014).

Consequently, academic achievement can be considered as a multidimensional concept that evidences the learnings of students at different levels. These learnings are not only linked to the contents acquired by the students, but also to their cognitive, emotional, social, and physical development (Kumar & Lal, 2014). Thus, in general terms, academic achievement shows the level of mastery achieved by students in relation to a series of previously established and diverse learning standards (Robinson & Biran, 2006). According to Fan and Chen (2001), said learning standards range from global indicators –such as permanence in compulsory secondary education or grades– to indicators linked to

students' aspirations or to their academic self-concept, also considering more specific elements –such as the results obtained in standardized tests on a specific subject–.

Research on the determinants of academic performance

Regardless of the approach adopted in the conceptualization and assessment of academic performance, there is no doubt that the level of academic achievement of students is one of the main indicators of the quality of education systems. Therefore, the improvement of education systems requires to deepen in the aspects that influence educational outcomes.

Traditionally, students´ intelligence has been considered the most important conditioning factor of academic performance, being the most studied personal variable in educational and psychological scientific research (Ali & Ara, 2017; Ferragut & Fiero, 2012; Gunawardena et al., 2017; Smedsrud et al., 2019). However, more recent investigations seem to confirm that, although intelligence explains an important part of academic performance, there are numerous factors that, being closely interrelated, contribute to explain the variability of educational outcomes (Akbas-Yesilyurt et al., 2020; Bhowmik, 2019; McCoach et al., 2017; Nisar & Mahmood, 2017; Olmos Rueda & Mas Torelló, 2013).

The large number of empirical studies that have analyzed how these variables predict and explain student learning generates the need to carry out review studies that allow to identify the main determinants of academic performance and their associated effects. For this reason, meta-analyses summarising the empirical evidence on the factors that influence educational outcomes have been conducted since the past century. Said meta-analyses consist on systematic reviews and statistical procedures that provide a quantitative estimate of the mean effect of a variable on the basis of the findings derived from previous studies (Russo, 2007). Also, although less commonly, meta-syntheses on the predictive capacity of certain variables on academic performance have been published, allowing the results from meta-analyses to be compared and summarized (Higgins, 2016).

A meta-synthetic investigation of reference in the field of academic achievement is the review published by Hattie (2017), who analyzed

the influence of students´ own characteristics, their families, and various aspects of schools on academic achievement. In his research, the author highlighted the positive influence of some personal variables such as previous high academic achievement and self-efficacy, as well as the pernicious influence of boredom, depression, use of minority languages, superficial motivation, sleep problems, attention deficit hyperactivity disorder and hearing difficulties. The author also demonstrated the positive effects that certain family variables such as home environment and socio-economic status, as opposed to corporal punishment, excessive television consumption, or benefitting from welfare policies, have on academic performance. Moreover, Hattie (2017) observed the influence that school and teacher variables have on academic performance, highlighting the positive effects of teacher effectiveness and the negative influence of aspects such as student suspension, excessively long summer holidays or school changes.

The meta-synthetic work published by Sipe and Curlette (1997) should also be mentioned. In their investigation, the authors conducted a synthesis of 103 meta-analyses published between 1984 and 1993 which were aimed at studying the variables that influenced academic performance. The research is centered on the influence of different personal, family, school, and teacher aspects on students' academic performance. Also, it provides an in-depth overview of the characteristics of the meta-analyses on which it is based –evidencing the major role of motivation, personal skills, home environment, quality of teaching and classroom social group –.

With the aim of providing an updated overview of the factors that condition the educational outcomes achieved by students and of the characteristics of the meta-analyses that study these factors, this research consists of a systematic review of the meta-analyses that have synthesized the effect of personal, family, school and teacher aspects on academic performance over the last 25 years. Thus, the present study is a continuation of the review carried out by Sipe and Curlette (1997).

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Method

This systematic review was conducted following the *Preferred Reporting Items for Systematic Reviews and Meta-Analyses* (PRISMA) guidelines, as well as its bias control procedures.

The search and selection processes are described below. The inclusion criteria, the coding procedure and the analysis of the coded information are also described in the following sections.

Search procedure

The search for articles was performed in the two main international databases with multidisciplinary coverage: Web of Science and Scopus. ERIC and APA PsycInfo (EBSCOhost) databases, which are specialized in education and psychology, respectively, were also used.

Given that the purpose of this search was to identify meta-analyses aimed at analyzing the effect of personal, family, school and teacher variables on academic performance, a search equation that combined both terms (meta-analysis and academic performance) was used using the Boolean operator "AND" (Table I).

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TABLE I. Terms used in the search equation

Meta-analysis	Academic achievement
"meta analysis" OR "meta-analysis" OR "metaanalysis" OR "meta-analytic" OR "meta analytic" OR "metanalytic" OR "meta synthesis" OR "meta-synthesis" OR "metasynthesis" OR "qualitative synthesis" OR "systematic review" OR "systematic literature review" OR "systematic scoping review" OR "systematic qualitative review" OR "systematic quantitative review" OR "systematic meta-review" OR "systematic critical review" OR "systematic mapping review" OR "systematic search and review" OR "systematic integrative review"	"academic* achievement*" OR "academic* performance*" OR "academic* outcome*" OR "academic* success*" OR "academic* competence*" OR "academic* attain*" OR "academic* improvement*" OR "academic* output*" OR "academic* learning*" OR "school* performance*" OR "school* outcome*" OR "school* achievement*" OR "scholastic* achievement*" OR "education* outcome*" OR "education* achievement*" OR "education* attain*" OR "education* improvement*" OR "education* output*" OR "education* performance*" OR "student* achievement*" OR "student* competence*" OR "student* attain*" OR "student* improvement*" OR "student* output*" OR "student* outcome*" OR "student* learning*" OR "student* performance*" OR "performance* level*" OR "learning* outcome*" OR "learning* attain*" OR "learning* achievement*" OR "learning* performance*" OR "achievement* gain*".

In order to complement and update Sipe and Curlette´s (1997) findings, this search was limited to articles published between January 1994 and December 2019, so that evidence for the 25 years after those years considered in said study could be provided. This process was carried out on October 27, 2020, and resulted in the retrieval of a total of 1230 records. Of these records, 235 came from APA PsycInfo, 187 were from ERIC, 405 belonged to Scopus and 403 were obtained from the Web of Science.

Elegibility criteria

Taking the inclusion criteria proposed by Sipe and Curlette (1997) as a reference, the following inclusion criteria were established for the selection of the studies included in this synthesis:

- Topic: effects of personal, family, school, and teacher variables on students' academic performance. Only studies in which the dependent variable was academic performance, both in general or in a specific subject, and in which the independent variable was personal, family, school or teacher characteristics were selected. Meta-analyses focusing on the effect of specific interventions or methodologies on students' academic performance were excluded.
- Type of study: meta-analysis with at least a mean effect size derived from primary studies reflecting the mean influence of an independent variable on academic achievement.
- Design: quantitative or mixed. It was required that the article provided a measure of the magnitude of the effect. Therefore, systematic reviews with qualitative syntheses of the results or that were based on path analysis and meta-regressions were excluded.
- Population: students enrolled in any stage of the formal educational system, excluding papers focused only on higher education or on any type of non-formal education. Articles analyzing academic performance in specific populations (e.g., students with chronic diseases or people with disabilities) were not considered either.

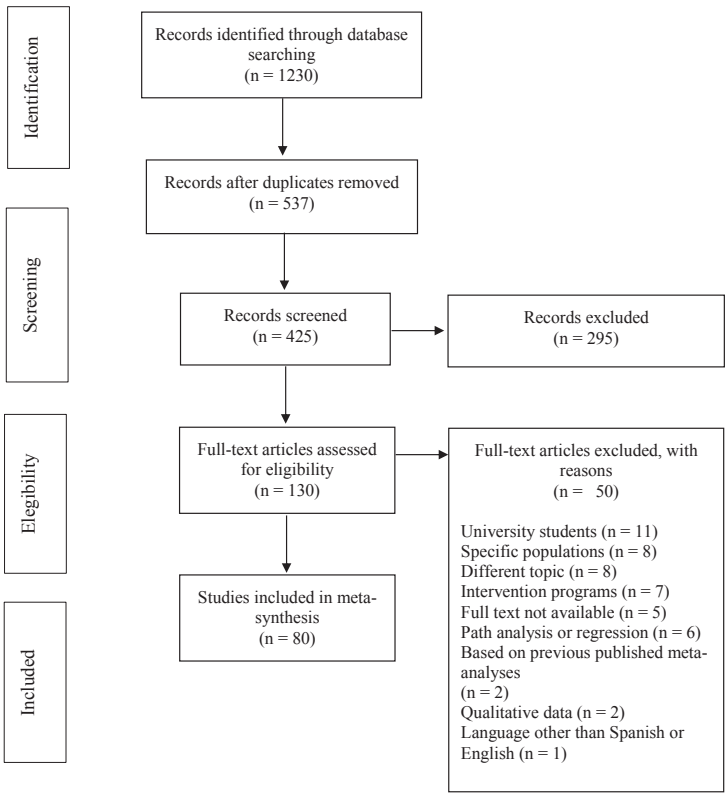
Together with the above, it should be noted that only studies published in scientific paper format and in the English or Spanish language were considered.

Selection process

The study selection process began by eliminating duplicates, which resulted in a total of 537 unique records. After discarding all documents published in a language other than English or Spanish, or in a format different to a scientific paper, the sample was reduced to 425 articles.

A review of the title and abstract was then performed. From this review, 295 publications that did not meet the aforementioned inclusion criteria were excluded. To avoid selection bias, each of the records was reviewed independently by two researchers, with an agreement rate of 91.43%. This percentage reflects the relationship between the number of agreements and the total number of articles reviewed. Finally, the full text review of the 130 articles considered in the previous phase resulted in a final selection of the 80 articles included in the present meta-synthesis. Graph I shows the flow diagram of the search process and the study selection following PRISMA guidelines (Moher et al., 2009).

GRAPH I. Flow diagram of the study selection process



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Coding of variables

A data extraction sheet based on the Sipe and Curlette´s (1997) coding was used to code the information derived from each of the selected meta-analyses. Specifically, variables related to the search process, selection and coding of the primary studies, methodological characteristics of the meta-analyses, characteristics of the primary studies, dependent and independent variables involved, and results obtained were considered.

For the search process and selecting and coding of the studies, information on the following aspects was collected:

- *Meta-analysis protocol used*: (1) PRISMA, (2) other meta-analysis procedures, and (3) not specified.
- *Sources*: (1) databases, (2) ancestry, (3) search in specific journals, (4) grey literature, and (5) other sources. Within the category 'databases' a distinction was made between (1.1) Web of Science, (1.2) Scopus, (1.3) ERIC, (1.4) PyshInfo, (1.5) Medline, (1.6) PubMed, (1.7) ProQuest Dissertations and Theses, (1.8) Google Scholar, and (1.9) other databases.
- *Study selection process*, considering whether in the selected meta-analyses: (1) the inclusion criteria were specified, (2) the exclusion criteria were specified, (3) the search years were specified, (4) the keywords used were specified, (5) the bias in the quality of the studies was controlled, and (6) the selection of studies was performed by several investigators. In turn, in those meta-analyses in which the selection of studies was carried out by several investigators, we also coded whether (6.1) the agreement index was calculated and, if so, (6.2) the agreement index provided.
- *Coding of variables*, recording whether (1) the search equation was specified, (2) information on the coding process was provided, and whether (3) the coding of variables was carried out by several investigators. If so, we coded whether (3.1) the index of agreement between coders was calculated and, if so, (3.2) the index of agreement provided.
- Regarding the methodological characteristics of the meta-analyses, the following variables were considered:
- *Control of publication bias*. First, we coded whether the studies (1) provided information about publication bias and, in those cases in which they did, we reported the procedure used: (1.1)

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fail-safe number, (1.2) funnel plot, (1. 3) Spearman rank-order correlations, (1.4) trim and fill, (1.5) Egger's test, (1.6) Begg and Mazumdar rank correlation test, (1.7) Kendall's rank correlation, (1.8) moderator analyses, and (1.9) other procedures.

- *Statistics extracted from the primary studies for calculating the mean effect size:* (1) correlations, (2) means and standard deviations, (3) betas, (4) odds ratios, and (5) other statistics.
- *Procedure for the calculation of the mean effect size:* (1) Fisher's z, (2)standardized mean difference (Cohen's d and Hedges' g), (3) odds ratio and (4) R.
- *Effect size estimation:* We coded whether meta-analyses provided information on (1) the confidence interval for the effect size, (2) the presence of outliers, (3) the absence of outliers, and (4) the type of model estimated. Within this last category, we recorded whether they estimated (4.1.) a fixed effects model, (4.2.) a random effects model, or (4.3.) both models (fixed effects and random effects).
- *Heterogeneity analysis:* First, we coded whether studies (1) assessed heterogeneity of effect sizes and, if so, the procedure used: (1.1) Q, (1.2) I^2, (1.3) Tau2, and (1.4) other procedures.
- Based on the characteristics of the primary studies included in each of the meta-analyses, information was obtained on the:
- *Number of articles included in the meta-analyses.*
- *Geographical limitation*, indicating whether geographical limitation was established as an inclusion criterion for the selection of articles.
- *Educational stage*. The educational levels at which the students in the primary sample were enrolled were recorded: (1) early childhood education, (2) primary education, (3) secondary education, and (4) university.
- *Measure of the dependent variable*: (1) general academic performance and (2) performance in a specific subject or area.

The independent variables considered in each of the meta-analyses were also collected and, on the basis of the classification established by Hattie (2009)[2], they were classified according to the categories listed in Table II.

[2] According to the needs derived from the variables identified in our study, 3 new subcategories and 14 indicators were added to the categories proposed by Hattie (2009). Thus, while Hattie established

TABLE II. Categories considered for the classification of the independent variables

Category	Subcategory	Indicator
Student	**Attitudes and dispositions**	Attitude to school subjects
		Cognitive processes and self-regulation*
		Concentration, persistence, and engagement
		Emotional intelligence*
		Happiness and well-being*
		Personality influences
		Procrastination and boredom*
	Background	Creativity
		Intelligence*
		Prior achievement
	Free time use*	Media use*
	Physical attributes	Ethnicity
		Exercise
		Gender (female)
		Health
		Sleep*
		Prematurity
		Other (crossed laterality) *
Family	**Family structure**	Non-resident fathers (father in prison)
	Home environment	Parental involvement in learning
	Socioeconomic and cultural status	Cultural capital*
		Socioeconomic status
	Well-being*	Child maltreatment*
Teacher	**Professional development**	Professional development
	Quality of teaching	Quality of teaching
	Teacher characteristics*	Teacher characteristics*
	Teacher-student relationships	Teacher-student relationships

22 subcategories and 66 indicators, the variables in our study have been classified according to the categories identified in Table II.

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School	**Classroom compositional effects**	Class size
		Decreasing disruptive behavior measures*
		Mainstreaming
		Single-sex classes*
	Classroom influences	Climate of the classroom: classroom management
		Peer influences
	Principals and school leaders	Principals and school leaders
	School compositional effects	Out-of-school curriculum experiences
		Summer vacation effect
		School organization*
	Types of schools	Charter schools
		Religious schools

* Subcategories and indicators marked with an asterisk have been added to those proposed by Hattie (2009).

Finally, information of each meta-analysis on (1) the estimated mean effect size and (2) the number of effect sizes from which said effect size was estimated was collected.

Data analysis procedure

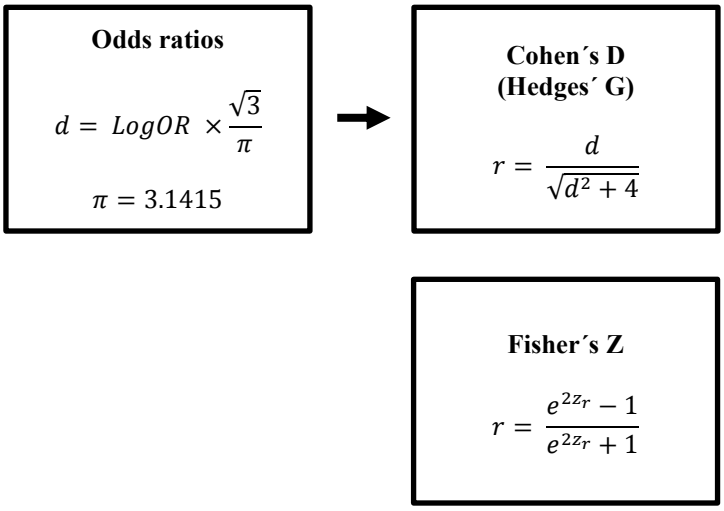
Based on the coded information, we first analyzed the extent to which the 80 meta-analyses included the selected aspects related to the search process, selection and coding of the primary studies. We also analyzed the methodological procedure used. The main characteristics of the primary studies included in these meta-analyses were also analyzed. For this purpose, the frequencies of appearance and their respective percentages were calculated. Likewise, the main descriptive statistics (minimum, maximum, mean and standard deviation) were estimated for the number of studies included in these reviews.

Secondly, the influence on academic performance of the independent variables extracted from the meta-analyses was analyzed. Specifically, the 127 mean effect sizes reported by the 80 meta-analyses were synthesized

according to each of the categories, subcategories and indicators in Table II. The process followed to achieve this purpose consisted of three stages:

- In those meta-analyses in which two mean effect sizes were provided for the same sample of studies –one estimated on the basis of the fixed-effect model and the other from the random-effects model–, only one measure of the magnitude of the effect was selected. For this purpose, the indications provided by the authors on the suitability of each of the two models were considered. For the six publications that did not provide this information, the most appropriate model was selected on the basis of the number of effects included, the heterogeneity of the effect sizes and the authors' intention to generalize the results (Borenstein et al., 2010; Tufanaru et al., 2015).
- Second, we converted all mean effects sizes to the same metric in order to combine them. Specifically, standardized mean differences, odds ratios, and Fisher's z were transformed to R (see Figure I).

FIGURE I. Transformation applied to convert effect sizes to R



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- All estimates were calculated using Microsoft Excel. Finally, mean effect sizes reported by the selected meta-analyses were combined for each of the categories, subcategories, and indicators considered through the calculation of their simple arithmetic mean. Along with this mean effect size measure, information on the maximum and minimum mean effect size was calculated. The resulting effect sizes are interpreted according to the criteria established by Cohen (1992): small (.10), medium (.30) and large (.50).

Results

Description of the search process, selection and coding of the studies

The results show that, although a high percentage of meta-analyses (80%) did not specify the protocol used (see Table III), PRISMA was the most widespread procedure in these studies (13.75%).

Regarding the search sources, all the authors used databases in their search, being ERIC (68.75%) and PsycInfo (65%) the most widely used. The ancestry method was selected as a secondary search method in more than half of the studies (65%), with the search in specific journals being the least used complementary procedure for the identification of primary studies (12.5%).

Regarding the study selection process, 97.5% of the meta-analyses indicated the inclusion criteria; however, only half of them (45%) detailed the exclusion criteria. Differences were also observed in the degree of specification of the keywords used in the search, since, although 60% of the authors reported the search terms used, only 38.75% provided the complete search equation.

Another remarkable aspect is that in only 17.5% of the meta-analyses more than one researcher intervened in the selection of the studies. Also, the agreement index between researchers was calculated on 5% of occasions. This percentage is higher for the coding of variables, since 67.5% of the meta-analyses reported the participation of more than one researcher in this process. Of these, 40% provided an index of agreement between coders.

TABLE III. Description of the search, selection and coding process of the studies in the 80 meta-analyses considered

Description of the search process, selection and coding of the studies		Yes	Percentage
Protocol	PRISMA	11	13.75%
	Other	5	6.25%
	Not specified	64	80.00%
Search sources	Databases	80	100.00%
	WoS	23	28.75%
	Scopus	6	7.50%
	ERIC	55	68.75%
	PsycInfo	52	65.00%
	Medline	10	12.50%
	PubMed	11	13.75%
	ProQuest Dissertations and Theses	19	23.75%
	Google Scholar	20	25.00%
	Other	58	72.50%
	Ancestry	52	65.00%
	Specific journals	10	12.50%
	Grey literature	26	32.50%
	Other	10	12.50%
	Reviews and previous studies	3	3.75%
	Books and reports	2	2.50%
	Hand search	5	6.25%

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Study selection process	Inclusion criteria are specified	78	97.50%
	Exclusion criteria are specified	36	45.00%
	The search years are specified	66	82.50%
	The keywords used are specified	48	60.00%
	The search equation used is included	31	38.75%
	Controlling for bias in the quality of the studies	27	33.75%
	The selection of studies is carried out by several researchers	14	17.50%
	The index of agreement between researchers is calculated	4	5.00%
	Over 80 %	2	2.50%
	Over 90 %	2	2.50%
Variable coding	Information on the coding of variables is provided	68	85.00%
	The coding of variables is carried out by several researchers	54	67.50%
	The agreement index between coders is calculated	32	40.00%
	Over 70 %	3	3.75%
	Over 80 %	6	7.50%
	Over 90 %	23	28.75%

Methodological characteristics

Considering the methodological characteristics of the meta-analyses (Table IV), publication bias was calculated in 68.75% of the systematic reviews. Funnel plot was the most commonly used procedure (31.25%), followed by fail-safe N (26.25%) and trim and fill (25%).

The statistics mainly extracted from the primary studies were correlations (80%), means and standard deviations (25%) and regression coefficients (13.75%). The main procedure for the calculation of the effect size was R (47.5%), followed by estimation of the standardized mean difference (38.75%) and Fisher's z (13.75%).

The model used for the estimation of effect sizes was specified in 90% of the meta-analyses, with the random-effects model prevailing over

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the fixed-effects model (63.75% and 11.25%, respectively). In addition, most of the studies selected evaluated the heterogeneity of the effect size (85%), with Q (62.5%) and I^2 (42.5%) being the most commonly used procedures for this purpose.

Finally, the small number of studies reporting the presence or absence of outliers (22.5% and 6.25%, respectively) is noteworthy. In contrast, the confidence interval for the effect size was provided in most of the meta-analyses (85%).

TABLE IV. Description of the methodological procedure followed in the 80 meta-analyses considered

Methodological characteristics		Yes	Percentage
Control of publication bias	Publication bias is calculated	55	68.75%
	Fail-safe N	21	26.25%
	Funnel plot	25	31.25%
	Spearman rank-order correlation	5	6.25%
	Trim and fill	20	25.00%
	Egger´s test	17	21.25%
	Begg and Mazumdar rank correlation test	4	5.00%
	Kendall's rank correlation	9	11.25%
	Moderator analyses	4	5.00%
	Other	13	16.25%
Statistics extracted from primary studies	Correlations	64	80.00%
	Means and standard deviations	20	25.00%
	Beta	11	13.75%
	Odds ratio	4	5.00%
	Other	28	35.00%

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Procedure for calculating effect sizes*.	Fisher's z	11	13.75%
	Standarized mean difference (Cohen's d or Hedges' g)	31	38.75%
	Log odds ratio	9	11.25%
	R	38	47.50%
Estimation of the mean effect size	Confidence interval is reported	68	85.00%
	The presence of outliers is reported	18	22.50%
	The ausence of outliers is reported	5	6.25%
	The type of estimated model is specified	72	90.00%
	Fixed effects model	9	11.25%
	Random effects model	51	63.75%
	Fixed effects and random effects models	12	15.00%
Heterogeneity analysis	Heterogeneity between effect sizes is evaluated.	68	85.00%
	The type of procedure used to assess heterogeneity is specified	65	81.25%
	Q	50	62.50%
	I^2	34	42.50%
	Tau2	5	6.25%
	Other	6	7.50%

* Some of the meta-analyses used more than one procedure in the estimation of mean effect sizes.

Characteristics of studies included in meta-analyses

The mean number of primary studies included in the meta-analyses is 58.28, ranging from 2 to 310 publications (Table V). No geographical limitation was established for the primary studies in most cases (81.25%), so the majority of meta-analyses included studies carried out in any country.

Considering the educational stages on which the systematic reviews focused, most of these studies were based on primary investigations that were performed with populations of students from various stages. The highest prevalence was for studies which focused on kindergarten,

primary and secondary education (28.75%), followed by meta-analyses that considered primary and secondary education and university (20%).

Finally, with regard to the dependent variable, most of the selected meta-analyses analyzed the effect of personal, family, school and teacher characteristics on students' overall performance (92.5%), while the remaining 8.75% studied academic performance in a specific academic subject.

TABLE V. Description of the characteristics of the studies included in the 80 meta-analyses considered

	Minimum	Maximum	Mean	Std. Deviation
Number of studies included in the meta-analysis	2	310	58.725	59.58
Geographical limitation	**N**	**Percentage**	-	-
No	65	81.25%	-	-
Yes	15	18.75%	-	-
Educational stage	**N**	**Percentage**	-	-
Kindergarten and primary	1	1.25%	-	-
Kindergarten, primary and secondary	23	28.75%	-	-
Kindergarten, primary, secondary and university	8	10.00%	-	-
Primary	3	3.75%	-	-
Primary and secondary	16	6.25%	-	-
Primary, secondary and university	16	20.00%	-	-
Secondary	5	6.25%	-	-
Secondary and university	5	6.25%	-	-
Measure of DV*	**N**	**Percentage**	-	-
General	74	92.50%	-	-
Specific	7	8.75%	-	-

*In one of the meta-analyses, the mean effect size is estimated both for studies that considered specific performance and for those that considered general performance.

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Effects of the variables considered on academic performance

This section describes the main variables related to academic performance, taking as a reference the categories considered in Table II. In general terms, the results show the high effect that teacher characteristics have on academic performance in comparison to other variables, with a mean effect size of 0.25. In contrast, the mean effect size for student characteristics was 0.08, and for family and school variables, 0.06. However, according to Hattie (2009), these effect sizes encompass a great internal complexity derived from the diversity of variables that compose them and from the variation in the effect sizes associated with each of them. Due to this, they should be interpreted with caution. Consequently, our study is centered in the effects associated with each of the individual indicators, examining said effects in more detail.

Effects of student characteristics on academic performance

Although the mean effect size for the relationship between students' characteristics and their academic performance is 0.08, there are remarkable differences in the mean effect sizes associated with the variables that conform this category (Table VI). First, the effect size of the factors associated with *background* stands out, being positively related to academic performance ($\bar{r}$ = 0.34). More specifically, *intelligence* and *previous academic performance* have proven to be the aspects most closely linked to educational results, both showing mean effect sizes that, according to Cohen (1992), are medium-high ($\bar{r}$ = 0.40 and $\bar{r}$ = 0.34, respectively).

Attitudes and dispositions have an overall effect size of 0.16. However, some components of this subcategory, such as *cognitive processes* and *self-regulation, concentration, persistence and engagement*, and *emotional intelligence*, have mean effect sizes equal to or greater than 0.2. Regarding the effect of *personality influences*, it is worth noting that, despite the fact that certain personality types are negatively related to academic performance, the effect sizes for some others are high ($\bar{r}$= 0.50). By contrast, *procrastination and boredom* have an inverse relationship with academic performance ($\bar{r}$ = -0.15).

Finally, *physical attributes* and *free time use* in media are negatively associated with academic performance, although the overall effect sizes for both categories are close to zero. Of note, however, are effect sizes for *lack of health* ($\bar{r}$ = -0.29) and *prematurity* ($\bar{r}$ = -0.32), these being the *physical attributes* with the most pernicious effect on academic performance.

TABLE VI. Synthesis of the effect of student characteristics on academic performance

	Mean	Minimum	Maximum	N summary effect sizes	N effects
Attitudes and dispositions	.16	-.16	.50	33	-
Attitude to school subjects	.12	-	-	1	29
Cognitive processes and self-regulation	.20	.07	.40	9	2,296
Concentration, persistence, and engagement	.22	.11	.29	6	584
Emotional intelligence	.20	.20	.20	2	1,350
Happiness and well-being	.16	-	-	1	151
Personality influences	.16	-.08	.50	12	884
Procrastination and boredom	-.15	-.16	-.13	2	103
Background	.34	.22	.54	4	-
Creativity	.22			1	782
Intelligence	.40	.25	.54	2	62
Prior achievement	.34	-	-	1	11
Free time use	-.07	-.16	.08	7	-
Media use	-.07	-.16	.08	7	206
Physical attributes	-.07	-.39	.31	19	-
Ethnicity	.09	-	-	1	87
Exercise	-.01	-.18	.31	3	28

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Sleep	.05	-.14	.16	6	99
Gender (female)	.06	-.00	.11	2	538
Health	-.29	-.39	-.11	3	87
Prematurity	-.32	-.36	-.27	3	N/A
Other (cross laterality)	-.02	-	-	1	27
TOTAL STUDENT	.08	-.39	.54	63	-

Effect of family characteristics on academic performance

As in the previous section, although the students' family characteristics have a small mean effect on academic achievement when considered as a whole ($\bar{r}$ = 0.06) (Table VII), the mean effect sizes for each of the subcategories also vary for each of the categories. The fact that the *father is away from home* and, more specifically, in a situation of internment in a penitentiary center, presents the greatest negative mean effect on academic performance ($\bar{r}$ = -0.36). Although this effect comes from a single meta-analysis, it can be affirmed that this situation of absence increases the risk of low achievement among students.

A low mean effect size was observed with respect to *parental involvement in learning* ($\bar{r}$ = 0.09). However, this effect varies greatly depending on the specific aspects of this family involvement, with mean effect sizes ranging from -0.16 to 0.36.

The mean effect size of the *socioeconomic and cultural status* of the students is 0.14. Although the mean effect size of *socioeconomic status* is slightly higher than that corresponding to *cultural capital*, the effects are medium-low in both cases. Finally, the *lack of well-being* of the children, concretized in situations of *maltreatmen*t, presents a mean effect size that can be considered as medium-low ($\bar{r}$ = -0.15).

TABLE VII. Synthesis of the effect of family characteristics on academic achievement

	Mean	Minimum	Maximum	N summary effect sizes	N effects
Family structure	-.36	-	-	1	-
Non-resident fathers (father in prison)	-.36	-	-	1	13
Home environment	.09	-.16	.35	18	-
Parental involvement in learning	.09	-.16	.35	18	> 1,804*
Socioeconomic and cultural status	.14	.07	.27	5	-
Cultural capital	.13	.10	.16	2	345
Socioeconomic status	.15	.07	.27	3	981
Well-being	-.15	-.32	.19	3	-
Child maltreatment	-.15	-.32	.19	3	105
TOTAL FAMILY	.06	-.36	.35	27	-

* Two of the meta-analyses did not report the number of effects from which the mean effect size was estimated.

Effect of teacher characteristics on academic achievement

Teacher characteristics analyzed in the selected meta-analyses are positively linked to student academic achievement when considered as a whole ($\bar{r}$= 0.22) (Table VIII). Among them, *quality of teaching* is the most strongly linked to the students' results. While the overall effect for that subcategory is medium ($\bar{r}$ = 0.29), the mean effect size values for some aspects of *teacher quality* –such as teacher self-regulation– are notably larger ($\bar{r}$= 0.44).

Similarly, although overall the mean effect size for *teacher characteristics* can be considered as medium-low ($\bar{r}$= 0.21), some specific characteristics, such as leadership, present higher values.

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TABLE VIII. Synthesis of the effect of teacher-associated variables on academic performance

	Mean	Minimum	Maximum	N summary effect sizes	N effects
Professional development	.12	-	-	1	-
Professional development	.12	-	-	1	11
Quality of teaching	.29	.10	.44	3	-
Quality of teaching	.29	.10	.44	3	> 98*
Teacher characteristics	.21	.19	.26	2	-
Teacher characteristics	.21	.19	.26	2	1,076
Teacher-student relationships	.16	-	-	1	-
Teacher-student relationships	.16	-	-	1	N/A
TOTAL TEACHERS	.23	.10	.44	7	-

* One of the meta-analyses does not report the number of effects from which the mean effect size is estimated.

Effect of school characteristics on academic achievement

The results show that the mean effect size for school characteristics is 0.06 (Table VIII). Moreover, there is little variability among the second-level subcategories, which have overall effect sizes that, in general, can be considered as low.

Regarding the different subcategories, the mean effect size for *principals and school leaders* is 0.14. However, there are remarkable differences in the mean effect sizes reported depending on the aspects of leadership considered in each of the meta-analyses, with values ranging from $\bar{r} = 0.04$ to $\bar{r} = 0.49$.

The mean effect size for the *school compositional effects* is 0.12, with *school organization (school culture)* having the highest mean effect size within this subcategory ($\bar{r} = 0.25$).

The subcategories related to the classroom –*classroom compositional effects* and *classroom influences*– present mean effect sizes close to zero.

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Within the former, the negative mean effect of the *measures aimed at reducing disruptive behavior (school suspension)* stands out ($\bar{r}$= -0.21). In relation to classroom influences, the mean effect size for the association between *classroom management* and academic achievement ($\bar{r}$ = 0.24) is remarkable, reaching a value of 0.42 in one of the selected studies. By contrast, *peer influence (bullying)* is negatively related to academic achievement, presenting a mean effect size of -0.13.

Finally, the types of school show a negative mean effect size on academic achievement, although there are differences within the subcategory. Thus, a small but negative mean effect size is observed for *charter schools* ($\bar{r}$ = -0.09), while the mean effect size is positive for *religious schools* ($\bar{r}$ = 0.13).

TABLE IX. Synthesis of the effect of school-associated variables on academic achievement

	Mean	Minimum	Maximum	N summary effect sizes	N effects
Classroom compositional effects	.02	-.21	.10	10	-
Class size	.10	-	-	1	120
Decreasing disruptive behavior	-.21	-	-	1	43
Mainstreaming	.06	-	-	1	143
Single-sex classes	.04	.02	.06	7	114
Classroom influences	.05	-.14	.42	4	-
Climate of the classroom: classroom management	.24	.05	.42	2	N/A
Peer influences	-.13	-.14	-.12	2	58
Principals and school leaders	.14	.04	.49	8	-
Principals and school leaders	.14	.04	.49	8	426
School compositional effects	.11	.04	.23	4	-
Out-of-school curriculum experiences	.09	-	-	1	3

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School organization	.23	-	-	1	25
Summer vacation effect	.06	.04	.09	2	63
Types of schools	-.03	-.14	.13	4	-
Charter schools	-.09	-.14	.01	3	> 244*
Religious schools	.13	-	-	1	N/A
TOTAL SCHOOL	.06	-.21	.49	30	-

* One of the meta-analyses did not report the number of effects from which the mean effect size was estimated.

Conclusions

The present meta-synthesis, which is proposed as a continuation of Sipe and Curlette´s (1997) work, was aimed at analyzing the relationship between personal, family, school and teacher characteristics and students' academic achievement. Specifically, we have synthesized the results of 80 meta-analyses published between 1994 and 2019, which provided 127 effect sizes.

In their meta-synthesis, Sipe and Curlette (1997) noted that the Glass procedure, followed by Hedges, was the most commonly used for conducting meta-analyses. However, the most used method in the selected studies of our research was PRISMA. Since it was first published in 2009, it did not appear in the review conducted by these authors (Moher et al., 2009).

An evolution in the search procedures is also observed. Only 84% of the meta-analyses provided information on the search process in the study by Sipe and Curlette (1997), in contrast to the 100% of articles on which this meta-synthesis is based. Furthermore, the most commonly used procedure in the meta-analyses carried out before 1994 was ancestry (68%). It is also noteworthy that 32% of them did not use the computer as a search tool; this contrasts with the widespread use of information and communication technologies today (Dobrota et al., 2012). However, the high number of authors using ERIC –which constitutes the main database specialized in education– is an aspect that coincides with the work done by Sipe and Curlette (1997).

There have also been notable advances towards a greater description and detail of the search processes. This is a very important issue given that replicability constitutes one of the paths to confirm the validity of a new scientific finding (National Academies of Sciences, Engineering, and Medicine, 2019). Sipe and Curlette (1997) identified that many details about the search procedures were not present in the selected meta-analyses, thus hindering the replicability of the studies. For example, only 29% of the meta-analyses indicated the start year and 26% the end year, while 82.5% of the meta-analyses included in our synthesis provided this information. Similarly, whereas in the previous review only 27% of the meta-analyses listed the keywords used, this percentage rises to 60% in our work. Advances are also observed in the information provided on the variables coded, from being described in less than half of the meta-analyses prior to 1994, to being described in 85% of the studies included in this meta-synthesis. Furthermore, whereas in the former revision only 20% of the selected meta-analyses used two coders in the study selection process, this percentage has now risen to 67.5%. There has also been a notable increase in the information provided on the rate of agreement, rising from 3.26% to 40%.

With regards to the methodological procedures, there has been a notable increase in the proportion of meta-analyses reporting the confidence interval: 85% of the meta-analysis in this synthesis compared to the 22% reported by Sipe and Curlette (1997). This fact could be explained by the greater difficulties in performing statistical calculations prior to the development of new techniques, in contrast to the present existence of computer technology and the widespread accessibility of specific data analysis software, all of which has led to a rapid evolution in statistical methodology in recent years (Barreto-Villanueva, 2012; Sagaró & Zamora, 2019). Also, similar values are observed in both works in relation to the percentage of studies reporting the presence of outliers, with these values hovering at around 25% in both cases (26% vs 22.5% in the present work).

Sipe and Curlette (1997) also provided information on the procedures used to calculate the heterogeneity of the effect size, detecting that 13 publications (12.6%) used the Q test. This aspect contrasts with 62.5% of the meta-analyses that used the Q test in our study. Moreover, since the Q test only reports the presence or absence of heterogeneity, I^2 is an

interesting complement for its quantification (Huedo-Medina, 2006). In our study, 42.5% employed this procedure.

Our results show that there is also a greater use of fail-safe N to calculate publication bias, since the percentage has increased from 9% to 26.25%. This increase is in line with the findings of Heenee (2010), who detected an exponential increase in the use of fail-safe N in meta-analyses between 1979 and 2008. However, our study reveals that other procedures –such as the funnel plot (31.25%) and trim and fill (25%)– are nowadays used to a greater extent than fail-safe N.

Considering the results derived from the effect sizes of student variables[3], Sipe and Curlette (1997) identified the highest mean effects for *motivational aspects*, followed by those related to *student skills*. These results are in partial agreement with those obtained in the present research, where both *student background* ($\bar{r}$ = 0.34) and student *persistence, concentration and engagement* ($\bar{r}$ = 0.22) are the most strongly related to the personal aspects of academic performance. Hattie's (2017) findings are also in this line, since he observed that the variables linked to these aspects presented mean effect sizes close to d = 0.5 ($\bar{r}$ = 0.24). *Leisure time use* is also presented as a student variable related to performance in Sipe and Curlette's (1997) study, although their mean effect size comes from a single paper. In their synthesis, studies on *leisure time use* have been found in relation to media use, which is negatively linked to student achievement. This may be associated with the large amount of time spent on media not only during adolescence but also at very early ages (Hadders-Algra, 2020; Spina et al., 2021). Beyond these findings, our research has also demonstrated the importance of *cognitive processes and self-regulation*, *emotional intelligence*, *health* and *non-prematurity* in academic performance.

With respect to family characteristics, although Sipe and Curlette (1997) only studied the *home environment*, their results are consistent with those obtained in this paper, being the variable with the smallest mean effect size of all those considered. In this vein, although Hattie (2017) did not provide an overall effect size either for family characteristics in general, or for home environment in particular, he reported higher mean effect sizes than those obtained in our synthesis for the categories of *parental*

[3] Sipe and Curlette (1997) did not provide results for all the categories established in this meta-synthesis.

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involvement ($\bar{r}$= 0.24; versus $\bar{r}$= 0.09) and *socioeconomic status* ($\bar{r}$= 0.25; versus $\bar{r}$= 0.15). These results are also consistent with the investigation of Castro et al. (2015), who found medium effects on the variables related to parent-child communication.

In relation to the factors associated with teachers, Sipe and Curlette (1997) highlighted the effect of *quality of instruction*. This variable not only presented one of the largest mean effect sizes in our synthesis ($\bar{r}$ = 0.29), but also yielded a similar result to that reported in the work by Hattie (2017)[4] ($\bar{r}$= 0.24). Our findings also demonstrated the influence of *teacher characteristics* on students' academic performance. However, it should be recalled that our study has excluded from its analysis any research directly related to the effect of specific interventions or methodologies. It is possible that personal or behavioral variables of teachers, as well as classroom management variables, may be directly implicated in many of those studies.

Finally, although Sipe and Curlette (1997) only considered the influence of the *classroom social group* within the scope of school factors, its low effect size is again consistent with our results for this category. However, we have also detected other variables with higher mean effect sizes, such as the *climate of the classroom (classroom management)*, the *school organization (school culture)* and the pernicious role of *measures to reduce disruptive behavior*.

Although the aim of this work was to temporarily extend the research carried out by Sipe and Curlette (1997), we have also identified new personal, family, school and teacher variables that influence students' academic performance.

The comparison of the results of both studies shows that, although some personal variables –such as cognitive and attitudinal characteristics–, or the quality of teaching have historically maintained their status of predictors of academic performance, the most recent research is considering and demonstrating the role that variables like family involvement, socio-economic status or the climate and culture of classrooms and schools have on academic achievement. Therefore, this study shows an evolution in the explanatory factors of academic performance. Although, in some cases, this evolution might be due to changes in present-day societies, on

[4] In Hattie's (2018) study, teacher quality was measured through student perception.

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most occasions, it may be a consequence of an evolution in the variables considered and in the approaches adopted by the scientific community.

Our results thus provide a holistic and updated overview of the factors that may influence students' academic performance. This constitutes an opportunity for achieving the goal of giving fair and quality education to all students (Iglesias-Díaz & Romero-Pérez, 2021; Vera Sagredo et al. 2021) and for designing and implementing educational policies and interventions. Said interventions would be aimed, on the one hand, at strengthening those factors that contribute to improving academic performance and, on the other hand, at neutralizing the negative effects of the variables identified as pernicious. As shown in our study, said variables are related to having the father in prison, facing situations of abuse as a child, having health problems, or making excessive use of technology, as well as to being influenced by the peer group or receiving measures to reduce misbehavior.

Furthermore, systematized evidence on predictors of academic performance provides an opportunity for international organizations to access updated research on the factors that have proven their influence on student performance. This may help to facilitate the updating and inclusion of new variables in international assessments.

Moreover, our results evidence a methodological improvement in the procedures employed, which incorporate greater rigor in the techniques and specific search processes. However, as Sipe and Curlette (1997) pointed out, the main limitation of meta-analyses and, consequently, of meta-synthesis, is that it is likely that there are variables with influence on academic performance that have not been incorporated in systematic reviews. Similarly, it should be noted that, in a meta-synthesis, it is not possible to have information about aspects such as the controlled variables or the procedures and instruments used by the primary studies, nor is it to ensure homogeneity in the definition of the variables by these studies. Therefore, when interpreting the results, it is necessary to consider that meta-syntheses echo the limitations of the meta-analyses contained in them. Furthermore, when analyzing the findings, it should be remembered that this type of research does not reflect the interactions between variables, but it rather establishes the basis for the aspects that should be considered in confirmatory studies.

In this sense, meta-syntheses such as the one presented here provide solid evidence to draw a comprehensive map of the variables that

influence academic performance and to establish the basis for a deeper understanding of the relationships between them.

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The intelligence in the initial training of school counsellors. Learners' perspectives[1]

La inteligencia en la formación inicial de los orientadores. Perspectivas discentes

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Abstract

This article provides an approach to how the concept of intelligence is understood by school counselling students and its implications. Understanding what intelligence means to future school counsellors and how it influences the way they see human beings and educational processes is essential to interpreting and transforming counselling practices within schools. The sample consisted of 195 undergraduate and postgraduate students. The data collection strategies were group interviews and focus groups. The results suggest that most of the participating students related intelligence to genetics, endorsed

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a strongly deterministic view, and were aligned with a clinical model of disability, as opposed to a minority of participants who positioned themselves within the competency model. There was also a direct relationship between how they understood intelligence and the type of intervention they considered most appropriate. In contrast, participants had unanimous perceptions of the hierarchical, discipline-based curriculum and how some intelligences or abilities are rated more highly than others in schools. Among other conclusions, there is a clear need to strengthen initial training for school counselling, as it was found to be poorly addressed in university curricula.

Keywords: Intelligence; Educational Guidance; Attention to Diversity; Inclusive Education; Initial Training; Inclusive Education.

Resumen

Este artículo supone un acercamiento a cómo se entiende el concepto de inteligencia desde el alumnado en formación para el ejercicio de la Orientación Educativa, así como algunas implicaciones que se derivan de éste. Comprender qué supone para los futuros orientadores la inteligencia y cómo influye en la forma en la que entienden al ser humano y los procesos educativos, se hace fundamental para comprender y transformar las prácticas orientadoras dentro de la institución escolar. Para ello, se ha contado con la participación de 195 estudiantes de grado y postgrado, utilizando como estrategias de recogida de información las entrevistas grupales y los grupos focales. Los resultados obtenidos apuntan a que la mayor parte del alumnado participante relaciona inteligencia y genética, con un fuerte componente determinista, situándose dentro del modelo clínico de la discapacidad, frente a una minoría que se posiciona en el modelo competencial. Del mismo modo, hay una relación directa entre cómo entienden la inteligencia y el tipo de intervención que consideran más oportuna. En cambio, hay unanimidad respecto a la jerarquización del currículum mediante disciplinas y cómo se valoran unas inteligencias o capacidades sobre otras dentro de la escuela. Entre otras conclusiones, destacamos la necesidad de fortalecer la formación inicial con relación a la orientación educativa, hallando poca incidencia en los currículos universitarios.

Palabras clave: Inteligencia; Orientación Educativa; Atención a la Diversidad; Educación Inclusiva; Formación Inicial

Introduction

Today's society is characterised by its capacity for change, its dynamism and the complexity of existing technological, social and cultural developments. There are many social challenges to be addressed by schools, which notably include educational inclusion, one of the most complex (Arnáiz, Escarbajal, Alcaraz and de Haro, 2021). However, from a socio-cultural point of view, schools have not seen many changes in their two centuries of existence. As a result of modernity, they are devised from the perspective of technical rationality; schools are indeed in alignment with an organisational model and epistemological approaches that are still based on a highly bureaucratised and standardised model (Rivas, Cortés y Márquez, 2018).

In addition to operating on a division into disciplines, the differentiation between theory and practice, and the conception and management of intelligence and normality, *neoliberal morality* imposes mechanisms and concepts such as effectiveness, efficiency and educational quality, which maintain the homogeneous and reproductive character schools (Díez, 2018; Gárate, 2020; Rivas, 2018).

The concept of intelligence is one of the classic elements that still plays a very strong role in schools as institutions, as it works across didactic, organisational, and curricular aspects. The historical conception of intelligence is ideologically laden and has an enormous impact on how the subject is perceived in relation to the school. Likewise, according to Gould (1997) and Ovejero (2003), it can be a tool at the service of segregation, since students are grouped according to certain quotients and characteristics which straitjacket them into a specific standard based on a logic of what is considered to be normal.

A brief historical overview is given here to understand the concept of intelligence. The strand that came from the work of Francis Galton (1821-1911) considered intelligence to be fundamentally genetic, inherited; he even attempted to establish a correlation between excellence and genetic inheritance. A forerunner of the idea of eugenics, Galton had a purpose but no method to achieve it, as he had no instruments available to measure this intelligence with reasonable accuracy. At this point, Alfred Binet and Théodore Simon in 1905 developed the Binet-Simon scale to measure intelligence by means of a construct they called IQ (Intelligence Quotient), with subsequent revisions in 1908 and 1911. This continues to

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have a strong influence on how intelligence is understood today; the main instruments currently used to assess intelligence and cognitive abilities in school include the *Wechsler Intelligence Scale for Children* (WISC) and the *Standard Progressive Matrices Raven Scale* (Raven test), of which the concept of IQ is a cornerstone. The concept of IQ and the instruments used to measure it have therefore been taken from Binet. However, while Binet believed that intelligence is fluid, individual, shaped and malleable, Galton's ideas about the genetic factor of intelligence are still partly alive today (Angulo, 2020; Vílchez, 2002).

The concept of intelligence continued to evolve. According to Sternberg (1981), the way in which intelligence was defined changed over three, clearly-defined, different time periods. The initial period was characterised by the clash between the one-dimensional perspective, supported by theories such as Spearman's (1923), and the multidimensional perspective, which included theories such as Thomson's (1939). The second period comprised the hierarchical current, of which Sternberg himself was an advocate (1979), and the overlapping current, in which Sternberg cited studies such as that by Thurstone (1938). Thurstone argued that intelligence is made up of seven core, interrelated, primary skills (verbal comprehension, verbal fluency, reasoning, numeracy, spatial visualisation, memory and speed of perception). This was followed by the third period, in which the hierarchical perspective was combined with the overlapping perspective. Ultimately some other theories emerged, notably including Gardner's theory of multiple intelligences (2012).

The fact that the WISC is a constant in psychological and pedagogical assessment is a symptom, and perhaps a cause, of the conception of the IQ or of mental age in schools. It entails an archaic and outdated interpretation of the school's role in relation to the conception of intelligence, human beings, and their development; it can generate and even legitimise segregation within and outside educational institutions.

School counselling, therefore, when used as a technical apparatus that conducts a psychometric psychological and pedagogical assessment centred on the individual, can be a classification tool. By relying on the status of the scientific-technical expert, it measures, qualifies, classifies learners and promotes segregation, as international organisations have stated UNESCO (2020). Likewise, these practices that exclude and violate the rights of part of the pupils have been denounced and evidenced by numerous studies (Calderón and Habegger, 2017; Cologon, 2020;

Martínez-Usarrable, 2020), as well as by social organisations and citizen movements such as *SOLCOM* and *Quererla es Crearla*. Not only do these practices contravene international regulations and the *Convention on the Rights of Persons with Disabilities* (UN), ratified by Spain in 2008; it also ignores the scientific evidence that has shown that all human beings are able to learn, and that in fact we learn from differences. The study by Hehir et al. (2016) looked at 280 pieces of research from 25 countries that researched the benefits and disadvantages of ideas for segregation, integration or inclusion. It showed that pupils who were considered to have educational needs learnt more and better with pupils classified as mainstream, and vice versa. It may therefore even be necessary to create other categories or ways of speaking that move away from the dichotomy of learners with and without needs.

In view of the organisation and curriculum of the syllabuses of the degrees of the Faculty of Education Sciences in the University of Malaga (Pedagogy, Primary Education and Early Childhood Education), as well as in the Master's Degree in Compulsory Secondary Education and Baccalaureate Teaching, Vocational Training Teaching and Language Teaching (hereinafter 'MAES'), the concept of intelligence and its implications for schools are rarely mentioned and is only addressed superficially.

For these reasons, this paper focuses on understanding what the concept of intelligence means to trainee school counsellors at the University of Malaga. Additionally, it also seeks to assess the impact that it has on initial teacher training, given the paucity of research evidence of this object of study.

Methodology

This article is a result of the doctoral thesis entitled 'School Counselling and Inclusion at school. A Narrative-based Study of Initial Teacher Education'. This in turn forms part of the R&D&I project funded by the Spanish Ministry of Science, Innovation and Universities entitled: 'Emerging narratives on inclusive schools within the Social Model of Disability. Resistance, resilience and social change' (RTI2018-099218-A-I00).

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Objective

The objective was to discover what role the concept of intelligence plays in the initial training of school counselling professionals at the University of Malaga, and to identify what the dominant perspectives and conceptions were among them. The concept of intelligence was approached broadly, without taking a stance about it, thus allowing the students' conceptions to emerge, from one-dimensional approaches through to multiple intelligences. Given the nature of the study, an interpretative qualitative methodology was chosen, as it makes it possible to understand complex realities by relying on their individual characteristics (Simon, 2011).

Data collection strategies

A total of six group interviews were carried out. Four interviews were conducted with all MAES students specialising in *School Counselling (a subject that was part of Educational Processes and Contexts)* in both academic years 2019-20 and 2020-21. The remaining two interviews were held with students in the second year of the Degree in Pedagogy (Educational Organisation of Schools and Institutions) in the 2020-21 academic year, who had enrolled for the morning shift (half of those enrolled in the second year). This resulted in 195 participants (130 from the MAES and 65 from the Degree in Pedagogy). The interviews were conducted by the first author of this paper, who is also a lecturer in subjects related to these Bachelor's and Master's degrees.

Two main strategies were employed: group interviews and focus groups (Gutiérrez-Brito, 2009; Benavides-Lara et al, 2021). The group interviews yielded a wealth of information that deserved to be discussed in detail through focus groups. In this way, any core questions that had emerged and had been addressed in the group interviews were reviewed and reflected upon in depth by some of the participants.

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Participants

The participants were selected for two main reasons. One was accessibility, as they were students we taught, and the other reason was that they were in two stages of the training pathway for school counselling professionals (2nd year of the Degree in Pedagogy and specialising in the Master's degree in school counselling, aimed at obtaining a professional qualification to work in schools).

Analysis procedure

After holding these meetings with the students and carrying out an initial analysis, two focus groups were formed. They were intended to deal with emerging issues and to go further into some questions of special interest. One group was made up of MAES students and the other was comprised of undergraduate students. In both cases, the number of participants was eight subjects, accompanied by two researchers: a moderator-facilitator and an observer. The selection of participants from each group was aimed to represent all the sensitivities perceived in the interview phase in the best way possible. Given to their characteristics, these meetings were renamed as *Dialogical meetings with students*.

An inductive approach was used for the analysis, which relied on the software programme *NVIVO,* version 11, in the following two stages (Strauss and Corbin, 2002): (1) open coding, for the counting of words and the analytical process of categorising data, and (2) axial coding, abstracting the subcategories and forming the interpretative categories. The following interpretative thematic blocks were identified: *Perspectives on intelligence, Organisational and curricular implications, Intervention* and *Role of counselling*, and *Ideological dimension*. The first two are used in this paper.

The coding used for informants and methodological strategies throughout this paper can be found in the following table:

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TABLE 1. Resource identifiers

Resource	Identifier
Dialogical meetings with students (group interviews)	DMS
Focus groups	FG
Master's student	M
Undergraduate Student	U
Combined abbreviations	DMS-M, DMS-U, FG-M, FG-U

Ethical issues

Negotiations were entered into in order to address the ethical issues of the research, including a commitment to return the transcripts of all empirical material for modification or approval, and to guarantee anonymity through the use of pseudonyms. All of this was recorded in informed consent form signed by all participants.

Results and analysis

Perspectives on intelligence

Intelligence and its implications for the didactic and organisational regulation of teaching continue to play a central role in school organisation because, regardless of how it is conceived, it evolves throughout history and strongly determines practically all educational processes. The most widespread discourse at present, at least in the educational community, may be that of intelligence as the product of the interaction between biological support and context, regardless of the epistemological positions held (Alcívar and Moya, 2020; Caldera, Llamas and López, 2018, González 2014, Alcívar and Moya, 2020, López-Melero, 2018), based on an understanding of intelligence as a dynamic and flexible entity. In addition, theories such as Gardner's (2012) break with the one-dimensional view of intelligence, as they see it as a multifaceted,

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multifactorial, and multidimensional construct. However, when we talked to students about intelligence, we found that they had generally three ways of conceiving it. There was one large group of students who were prone to deterministic, biology-based views; there was a second group that tended towards eclecticism, that is, who positioned themselves between the clinical and competence-based paradigms; and a third group that was in the minority had a tendency towards a critical socio-constructivist perspective.

Deterministic, biology-based perspectives

A change in the use of language was observed in this group. There was an apparently new discourse in which the classic terminology surrounding intelligence seems to have been superseded, as can be seen in the following extract:

> *Intelligence has reached a point where it has become obsolete [...]I think that the word intelligence is no longer used in schools, or it is no longer being used to classify high-ability people and the words talent, competences and being 'top' is starting to be used. To have a gift, as we mentioned before. [...] The WISC had a quadrant where I put the IQ of each test and that is what tells me if the child is talented or not in something* (DMS-M, Ariadna).

The continued presence of the concept of IQ and its practical applications, from an individualistic, subject-centred perspective, led us to question of whether the conceptions underlying the idea of intelligence in the different groups have really been transformed with the emergence of new theories on intelligence. This is evidenced by the fact that most of the participants maintained the idea of IQ within a classification logic: 'according to this classification of intelligence, their IQ based on a number, pupils are already considered to be more intelligent, gifted' (DMS-M, Claudia).

The concept of talent, for most of the participants, replaced that of intelligence. This is due to the use of the conception of *multiple talents in counselling practice,* to refer to children who excel in several dimensions of intelligence. But what does the term 'talent' contribute when it replaces intelligence? What is the underlying notion behind this

idea? The genetic, biology-based character seems to be present in the idea of talent in the students' discourse: 'It depends on the predisposition to talent, because you can work on it, but there are people who have it... It's as if it was intrinsic to them' (DMS-M, Sandra). Despite the changes in language and even the use of socio-constructivist or multiple intelligences theories in the participants' discourse, a widespread idea was found whereby the concept of *intelligence*, now renamed *talent*, was close to Francis Galton's ideas, even though they seemed to have been overcome. For an important part of the participating students, *having talent* was synonymous with *being intelligent* 'I think that talent, like ability or whatever, is about predisposition, as my colleague said, as something innate' (DMS-M, Desirée); similarly, ability seems to be related to what we have had from birth: 'There are people who are born with certain cognitive abilities' (DMS-U, Andrea).

In the same vein, the idea of mental age has been replaced in the discourse of some students by the concept of 'levels'. However, different signifiers carry the same meaning here:

> *It goes by levels. there are some who will be able to aspire to a little more, but there are others who will not. For example, I have an uncle with Down's syndrome, and I really hate to think this, but it is impossible, because he is really like an 8-year-old child, not even 10 or 12, he is like an 8-year-old child* (DMS-M, Jane).

Eclectic perspectives

The second group of students, those who could be considered as tending towards eclecticism, were more cautious in terms of positioning themselves within one paradigm or another, due to what they see as the nature-nurture dichotomy. However, in their comments show how they attach greater importance to the biological, to what is inherited: 'The genetic factor is very important, but if it is not accompanied by a good context that helps you to continue to develop it, then someone's intelligence may not be used to its full potential' (DMS-U, Sonia). They argued that intelligence is related to a genetic substratum, which they see as a major conditioning factor, but not a guarantee of good development, as the context must make this development possible. For this group, 'you

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may know a lot about something, and that's one thing, but another thing is how you assimilate it and if you know how to apply it afterwards [...] partly you come with some of that' (DMS-U, Julio).

Another idea emerged: it is possible to promote intelligence. They argued that it is what we are interested in, what motivates us and what we practice that *makes us intelligent*. However, for this group of students, interests are largely conditioned by innate abilities. So, unlike the first group, who attributed intelligence directly to genetic inheritance, this time it was argued that intelligence, although constructed, is the product of inherited factors that predispose the individual to develop in one direction or another:

> *I think there is an innate part of intelligence when it comes to seeing what is of interest to that person. Because when you start your educational stage, you start to develop concerns, to develop interests in things that you don't know where they come from. When I was seven years old, I was already very interested in music, in art, and it's something that I hadn't been taught at school, I hadn't been taught at home either. Where does that come from? Well, it can come from spatial intelligence, different areas that develop more in you than being innate. Which also develop, of course they develop* (FG-U, Andrea).

The members of this group also pointed to the need to discard the concept of intelligence as an abstract entity and to adopt the term competence, understood as skill, instead: 'I think we need to talk about competence. I worked in the Down's Syndrome Association for many years, for example, and the kids were actually very competent, more than me for some things, and not for others' (DMS-M, Lidia).

The term competence, which is currently being strongly introduced in schools, ended up becoming part of the hegemonic discourse and current conceptions of intelligence. We must not forget that this term has its origins in the market, and that on many occasions it is related to the concepts of effectiveness, efficiency, quality and, in particular, to standardisation, as mentioned above. 'To say that an individual is competent means to affirm that his actions are coming up to a certain standard' (Barnett, 2001, p. 108). The standard is still related to concepts of intelligence, as it has not yet escaped the concept of normality; in this way, the link to the idea of competence is reaffirmed. Moreover, 'competency-based education is not aimed at developing a student's intelligence, but rather and more directly,

towards certain exercises and performances, uses and functions of that intelligence' (del Rey and Sanchez, 2011, p. 236)

The student profile in this second group held the use of psychometric instruments to determine intelligence in high regard. In their discourses they included some elements of the competency model (López-Melero, 2020), in which the relevance of psychometrics and the classical conception of intelligence is firmly questioned. However, they recognised that intelligence tests can be a useful tool, and accepted that they may attempt to measure something that they do not know:

> *What is intelligence? Many of us don't know how to give a clear answer about what intelligence is. [...] I believe that all these tests, more than measuring, give you information. We often use that information to categorise children; whereas this information gives us enough tools to be able to see where their weak point is in order to strengthen it* (FG-U, Andrea).

A discourse was taking shape at this point with an intention and assumptions that seemed to lead to the classic definitions of intelligence being overcome. Intelligence was presented as a set of possibilities, the fruit of interaction. The objectivity and efficacy of intelligence tests was questioned, but in an attempt to reconcile paradigms that are difficult to reconcile, their use was accepted as a guideline.

Environmental-socio-constructivist perspectives

There was also a third group that was in the minority, which relied on environmentalist and socio-constructivist concerns. These students were critical of the hegemonic discourse; even though the group was made up of only a few people, they were particularly willing to encourage debate and shared reflection. For them, mostly girls, intelligence is a construct, without denying that there is a biological underpinning. We are not born intelligent, we become intelligent in interaction with culture (Vygtoski, 1979) 'If intelligence is really the ability to reason or make decisions, I am not born with an innate ability to make decisions. Depending on the education I have received, I will be more or less determined' (FG-U, Alicia). This 'sector' of the participants not only moved away from

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deterministic tendencies, but also called into question the very concept of intelligence and its measurability.

They were critical of and opposed to the idea of the IQ and, therefore, the meaning and relevance of psychometrics:

> *I wouldn't know how to describe exactly what intelligence is. What I do know is that it is not what these tests measure. Because if in education we talk about the existence of multiple intelligences, I doubt very much that a specific test could measure the emotional intelligence of a person (these tests probably exist). So, I wouldn't know how to describe what intelligence is, but I think it's not the idea we usually have of what it is* (DSM, Joaquín).

Similarly, students within this profile pointed to the fact that an apparently new language is emerging, which has been emptied of content and subsequently filled with the meanings that have traditionally operated. For these students, adopting a new language without changing the ways of understanding intelligence, leads to maintaining the practices that have traditionally accompanied school counselling, as this student pointed out: 'I think if we replace intelligence with talent and continue to measure it in the same way, in the end we are still in the same situation. Just like, as I said before, now they are called competences and before they were called objectives, but we still work in the same way'. (DMS-M, Victoria)

School counselling, through mechanisms such as educational assessments that are mainly based on psychometrics and somewhat centred on the concept of intelligence, plays a major role in the order, control, and reproduction of a school that can segregate and exclude part of its pupils, in this case, under the pretext of disability, of abnormality, thus promoting inequality (Barton, 2009; Calderón, 2018).

Implications of intelligence: school organisation, psychological and pedagogical assessment, intervention and initial training

Intelligence and knowledge: impact on the curriculum

In the previous category, conflicting opinions were found as to whether or not intelligence is inherited and to what extent there seemed to be consensus on the idea that some core school subjects (so-called 'instrumental subjects') are more important than others. This means that some dimensions of intelligence are more highly valued than others. In contrast, some views were expressed along these lines:

> *In the education system we have, more work is done on some intelligences than on others. There is a lot of work done on linguistics, logic, mathematics. And there are other areas on which not that less work is done; that's why a person is considered more intelligent or less intelligent. If you have developed your linguistic ability, you will be considered to be more intelligent, if you have developed another ability that is not used as much in our school system, you will not be considered to be intelligent* (FG-U, Andrea).

> *So, if we talk about multiple intelligences, if we go to psychology, which is where I come from, there are different ways of understanding intelligences. But in real life in schools, the main focus is on language and mathematics. Are you good with numbers or are you good with words? And halfway in between, intermediate value is given to natural sciences, knowledge of the environment and so on, and lastly, to the arts* (DMS-M, Victoria).

They pointed out that 'the concept of intelligence is too closely associated with school performance' (FG-U Barbara). This in turn is linked to specific knowledge and skills, since 'intelligence includes a number of things that school does not promote in students' (FG-U, Alicia). The concentration of the curriculum on individual subjects is not only governed by a strong hierarchy, but despite the concept of competence being more popular than ever, the value of rote learning and discipline are still commonplace: '… *intelligences (and now there are eight or ten or 25)… in the end, the same intelligence, rote learning, still prevails in schools; and knowing how to keep quiet and do what you*

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are told and how you are told' (FG-M, Sofia). Additionally, some of the participants voiced the need for a personalised approach to education that seeks to foster the potential and interests of the pupils: 'nowadays in schools, for example, you may have a talent for drawing, but this doesn't matter; the important thing is that you get good marks in maths, language...'. I believe that schools should promote the individual talents of each person' (DSM, Maria).

These participants agreed that only a small part the learning that takes place at school is meaningful and relevant. They argued that the denaturalisation of knowledge and the curriculum, which is often foreign to the pupils' interests and is imposed on them, could be detrimental and prevent the creation of educational meaning:

> *I believe that I have learnt a lot more from the things that I have experienced at home, that I have experienced on the street, with my friends, that are useful to me today. I've learnt a lot more there than at school, although it's true that they also put you in situations where you have to...It's not just about taking an exam, but most of the things you learn outside, I think* (DMS-U, Pepe).

Shortcomings in initial training programmes: psychological and pedagogical assessment as psychometrics

This approach has an impact on the students' view of school counselling. The group agreed that, in the same way that schools do not provide an appropriate educational response, the university continues in the same direction, and therefore there are some shortfalls in the initial training of school counselling professionals:

> *It is very sad that we have finished our degree, we have already finished a Master's degree and we are still saying that we are not given enough tools and resources to deal with certain situations that we are afraid of. Or that we believe that we're not good enough because we hesitate in some situations* (FG-M, Alicia).

In this initial training, clinically-based psychological and pedagogical assessment, supported by psychometrics, plays a very important role, as the logic of classification remains. It keeps what is conceived of as

intelligence and normality in the purview of the school; in this way, it prepares students for what is regarded as the main task of primary school counsellors (Calderón and Echeita, 2014). This psychometrics-based approach in which education for counsellors is often perceived as training for technical experts collides with inclusion. It also generates epistemological conflicts among students, and an inability to profoundly understand these paradigms and the repercussions they entail for educational practice.

> *As human beings, we need to measure everything. To have everything under control and to find an answer to everything. I don't know whether to be in favour or against intelligence tests, for example, the WISC. I don't know whether to be in favour or against, but I think they can help us, I think they can in fact help us. But I think we are very obsessed with wanting to measure, with wanting to know why, so that we can classify. In order to have control* (FG-U, Denis).

Therefore, there is a need to focus on a wider range of approaches to school counselling, which goes beyond mainly intelligence-based methodologies and other approaches based on school placements as sources of knowledge to open up new professional and educational opportunities.

School counselling trainees' perspectives on intervention

We found that those students who defended the use of psychometric instruments as part of the psychological and pedagogical assessment process to provide an individualised response to pupils with SEN considered it essential to carry out interventions specific to special education: significant curricular adaptations, different forms of schooling, etc.

> *It would be interesting to intervene and take this child out of the classroom and occasionally work with them individually. And perhaps the counsellor here can act as a major filter, teacher and guide, to say what, at which point, with whom and how we can have an intervention so as not to harm so much the pupil's development and... the pace of the class* (DMS-M, Mariana).

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*I understand that if someone needs to be accommodated, it is because they already have limits. Adaptation will help to ensure that these limits are not so exposed, but without adaptation their limitation may be greater (*DMS-M, Serena).

As we can see, the idea of shortfall, of disability associated with children's bodies and minds, is still present (Ovejero, 2003). In the same way, keeping the 'normal' or 'joint' pace of the class is portrayed a requirement, giving rise to the need to segregate pupils who are not able to adapt, with the excuse of individualised learning and the concern for their correct development. However, if learning enables development, under-learning, subculture, will promote underdevelopment (López-Melero, 2018).

My brother-in-law, in kindergarten, had attention problems. They supposedly didn't diagnose him, they didn't do anything about his borderline intelligence. The only thing they did was to have him sitting by the teacher's table. That child, to this day, is not able to pick up a book. He simply cannot. The only thing they taught me in my degree was: 'well, the child is hyperactive and you get him to sit next to your table; whatever that child has... you put them next to your table' and that's what I think... And I think curricular adaptations are great, and I'll explain why. Ultimately, that person is going to finish up at the same place as you; the thing is that the needs are there, and that poor person is not to blame, but somehow that person has to be helped so that they can have the same skills that I have acquired at the end of the year. [...] But this doesn't mean that we are discriminating against this person, or anything like that. No way, it's the complete opposite (DMS-U, Lorena).

As noted, the lack of strategies and tools, as well as of epistemological foundations, may lead students to position themselves within the deficit model. However, a small part of the participants disagreed with these positions, They noted that the solution lies in methodology and organisation, rather than in individualised adaptation:

In the case of what our colleague here said, I do think that this curricular adaptation was detrimental. Because in the case of her friend, who had memory problems, instead of studying five units, she studied four, but maybe, I don't know, topic five was 'invertebrates'

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and she didn't really learn them. So, why not, instead of adapting the curriculum, change the methodology (DMS-U, Sonia).

In this regard, they not only presented arguments related to culture and development, but also pointed to the importance of expectations, especially for children: 'If you are limiting the child from the very beginning, you are undervaluing them and you are making them feel that they are not capable of doing something, the child will feel useless for the rest of their life' (FG-U, Luna). Significant curricular adaptations, and especially the different forms of schooling, become ceilings for learning because, 'if you pigeonhole a person as having a lower level, that person only has the opportunity to reach the lowest level' (FG-M, Alicia).

However, the group of students who supported a more biology-based view, akin to the clinical model, referred to reality as if it were something unique, static and given. They called for the need to maintain special education, among other issues, even if it means the segregation of part of the pupils, and reported some experiences from their placement in a special education school as an example:

I am thinking about what I have seen in that school. Really, what about those people? They're not going to be anything in life then...I don't know, it's impossible to put one of them in an ordinary classroom. You can't. Nor in a dedicated classroom. No (DMS-U, Rocio).

It seems that the practical experiences they had during the degree had an enormous influence on them. These included their experience during their time in schools, which at best normally reflect integrative practices (Parrilla, 2002), situated in the deficit model.

It's just that some people have a certain level and they can't do more. They make an effort, they put as much effort into it, and everything. There are certain abilities, and their ability was not good enough. But...what now? What do you do with these children? (DMS-U, Nerea).
For me, the idea of putting, for example, a child like that with the problems they have, in a classroom, is crazy. You're knocking the child down, you think you're helping them, but you're basically knocking them down, really (DMS-U, Julio).

The response to diversity by having different forms of schooling was assumed to be the best option, almost as the only one, by a significant part of the participants. They argued that a suitable educational response

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for certain children can only be provided in this way, as the limitations of these children force us to do so. Segregation is thus pedagogically justified. However, arguments were found from students with a more socio-constructivist profile that pointed out the importance of co-existence among all pupils for full socialisation, thus rejecting any organisational, didactic or curricular proposal that involves separating some from others: 'human beings imitate others, when we are with our group of friends, we imitate certain behaviours or certain attitudes that they have. So, to support what I said, we always need to be in partnership' (FG-U, Jasmine).

Discussion

The results obtained show that different ways of understanding intelligence coexisted among the participating students. Even within an apparently inclusive discourse, we found conceptions close to determinism. Others seemed more eclectic, but they more or less implicitly placed a psychometrically-based conception of intelligence at the centre of psychological and pedagogical assessment. This can result in counselling practices that translate into psychoeducational interventions and educational reports that are incompatible with educational inclusion (Calderón and Habegger, 2017; Cologon, 2020).

The views expressed by the participants show how the language used in the different discourses seems inclusive, but once we started talking and looking further, it was seen that behind this language, some of the participating students still held conceptions and engaged in practices based on psychometrics and the concept of IQ. While this change in language moderates discourses, at the same time it contributes to colonise these discourses, which together with deterministic conceptions of intelligence, may contribute to the reproduction of segregating practices (Rivas, 2018).

Almost 30 years after the Salamanca Statement (1994), the concept of inclusion is widely accepted at the discursive and normative level, but it has been gradually taken over, as this term hides segregating, or at best integrative, practices, which are legitimised by the psychological and pedagogical assessment. An assessment that is strongly influenced by psychometrics. Therefore, we believe that achieving an inclusive

school requires dismantling segregating organisational and didactic models, which use psychometrics, among other tools, to hold the subject responsible for something that is actually social and contextual (Ovejero, 2003; Calderón and Echeita, 2014). As Ovejero (2004) pointed out, the construction of the concept of IQ and the technical tools that measure it are not neutral. Inclusion requires a shift from deficit to opportunity; and from an individual's problem to the barriers to learning found in the context.

The clinical and medical model based on the notion of deficit aims to compensate for the shortfalls that present in pupils, according to the concept of *normality*. It is based on the idea that disability, like intelligence, is something objective and measurable, which lives within subjects, in their bodies and minds. These conceptions could in some cases be an obstacle to pupils' academic and life development (Calderón, 2014).

Regarding the curriculum and its organisation into disciplines, there seemed to be agreement among participants, irrespective of the profiles and how they positioned themselves vis-à-vis the concept of intelligence. They recognised a strong disciplinary hierarchy, in which some core subjects are imposed on the rest, which means that 'some intelligences' or human characteristics have a higher value than others within the school setting. In addition, the concept of competence was linked to ableism and so-called competence-based education (Barnett, 2001; Del Rey and Sánchez, 2011).

Conclusion

Training inclusive school counsellors compels us to question clinical and medical deficit-based models, which largely rely on conceptions that are close to genetic determinism. Questioning intelligence and normality is essential to stop talking about what pupils lack and make a shift towards understand that diversity is a value and that we learn from differences (Melero, 2020; Hehir et al, 2016; Vygotsky, 1979). As Calderón (2014) noted, accepting the new conceptions of intelligence, where its social and multifarious character is recognised, has 'a democratising effect on the social construction that derives from them' (p.466). This is crucial because, as pointed out by various nationally and internationally

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recognised scholars, democracy, equity and social justice are inherent in inclusive schools (Ainscow et al. 2013; Sapon-Shevin, 2013; Parrilla, 2002).

In short, we are faced with a challenge that is as urgent as it is necessary. International regulations such as the 2008 *Convention on the Rights of Persons with Disabilities* (UN, 2006), ratified by Spain in 2008, and the LOMLOE (Spanish Education Act) have declared that there is a need to transform schools to achieve an Inclusive Education. A school for all students, without exception. This involves that the different forms of schooling, if any, should be as unrestrictive as possible; that the focus should not be on subjects, but on systems; and that methodology should aim to be accessible and universal, rather than individualised. A project that is not possible without transcending the deficit-based culture, and for this we must rethink initial training.

One of the most important limitations detected in this study was the lack of previous research on how intelligence is studied in the initial training of school counsellors and what consequences this may have for their future professional practice and development. This is both a constraint and an inspiration for this and future research. Another limitation in carrying out the analysis was not hearing from teachers, as their ontological and epistemological position may be related to the students' construction of their concept of intelligence. It is therefore necessary to explore new avenues of research in order to understand the position of those who train future school counsellors with regard to intelligence.

Finally, looking prospectively into the future, we intend to bring the results of this study into dialogue with others that we have already begun, which are linked to which practices, organisational structures and didactic strategies are seen by trainees as being inclusive. It will therefore be interesting to see what role the concept of intelligence plays, and whether there is a relationship between the concept of intelligence and counselling practices.

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Continuing full-time education beyond compulsory schooling[1]

Continuar estudiando más allá de la escolarización obligatoria

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Abstract

In this article, we analyse the phenomenon of dropping out of school as soon as the minimum legal age (16 years old) is reached, its evolution over time and whether it affects specific social groups, using microdata from the Encuesta de Población Activa (Labour Force Survey), a quarterly source in which the same household is followed for up to six consecutive waves. Analysis was performed using the logistic regression technique (for dichotomous dependent variables) at four levels involving observations of individuals within their household context from 52 regions of Spain. Our analysis points to a steady increase in the proportion of pupils who continue in full-time education after the age of 16 and before reaching the legal age of majority (18). This only slowed down during school years that coincided with an improvement in the labour market. We also observed that the regions that are most favourable to low-skilled employment are those with the highest drop-out rates. Furthermore, we found that the migration status of individuals (in particular the age they arrive in Spain) is a key variable in the probability of them continuing in full-time education, whereas neither the person's home situation nor the concentration of migrants in the

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region are significant. In short, neither gender nor social class were significant discriminating factors in school enrolment rates of 16 to 17-year-olds. However, the probability of this leading to successful completion of an intermediate level of education (baccalaureate or vocational training) has not yet been analysed.

Keywords: school enrolment rate, post-compulsory education, multilevel model, Spain, gender, generation, immigration.

Resumen

Nos preguntamos por el fenómeno de abandonar la escuela en cuanto se cumple la edad mínima legal en que se permite hacerlo (los 16 años), su evolución en el tiempo y si afecta a determinados grupos sociales. Se utilizan los microdatos de la Encuesta de Población Activa, una fuente trimestral en que se sigue a un mismo hogar hasta un máximo de seis ciclos consecutivos. Se emplea la técnica de la regresión logística (para variables dependientes dicotómicas) con cuatro niveles de análisis: observaciones protagonizadas por individuos, enmarcados en hogares y residentes en 52 unidades territoriales. Se apunta a un sostenido incremento en la proporción de alumnado que continúa estudiando habiendo cumplido ya 16 años y antes de alcanzar la mayoría de edad, que solo se ha detenido durante los cursos escolares que han coincidido con una mejora en la situación del mercado de trabajo. También se observa que las regiones más favorables al empleo poco cualificado son las que presentan mayores tasas de abandono escolar. Además, se constata que la situación migratoria personal (en particular la edad de llegada a España) es clave en la probabilidad de continuar estudiando, pero no así el estado del hogar en relación a este factor ni la concentración migratoria en el contexto espacial de residencia. De hecho, la única variable familiar que se muestra significativa es el no convivir ni con la madre ni con el padre, que se encuentra asociada a una substancialmente menor probabilidad de continuar en el sistema escolar formal. En definitiva, ni el género ni la clase social presentan en la actualidad una fuerza discriminante significativa en las tasas de escolarización a los 16-17 años, aunque no se ha llegado a analizar la probabilidad de que ello conduzca a finalizar exitosamente un nivel medio de educación (bachillerato o ciclos formativos).

Palabras clave: tasa de escolarización, enseñanza postobligatoria, modelo multinivel, España, género, generación, inmigración.

Introduction

The current legislation in Spain allows individuals to leave school at the age of 16, subject to the consent of their legal guardian or guardians; from the age of 18, the age of majority, they can do so without having to ask for permission. Many international organizations agree that leaving school before the age of 18 is premature and that measures should be taken to reduce and, if possible, eliminate this phenomenon, as it hampers young people's employment prospects and is associated with poverty and social vulnerability (European Commission, 2011). The indicator usually used as an estimator of early school leaving is the percentage of the population aged 18 to 24 who do not have a sixth form leaving certificate and are not in full-time education. The European Union (EU), for example, set itself the target of reducing this indicator to less than 10% by 2020. This goal was just about achieved; according to data from Eurostat (the statistical office of the EU), that year, 2020, the early school dropout rate in the EU-27 was 9.9%. However, despite enormous improvement in recent years, Spain continues to be the country with the highest dropout rate: 16% in 2020 (although, to the country's credit, it should be noted that a decade earlier the level was ten percentage points higher). What are the reasons for this entrenched position? Will the downward trend in early school leaving continue in the coming years? Can we glimpse a convergence with European levels?

In this study, we assessed the scale of early school leaving from the opposite side of the phenomenon, namely the school enrolment rate of 16 to 17-year-olds, when it is legally possible to have left school without having reached the age of majority. We assumed that if an individual in this age range continued their education, they did so voluntarily. We did not consider age directly, but the school year according to an individual's year of birth; in other words, we worked with cohorts. This means that those repeating a school year were not taken into account, since someone could still be studying compulsorily at this age without having obtained the corresponding qualification. The source of data for this paper was the Encuesta de Población Activa (EPA) (Labour Force Survey), a quarterly survey of households that was carried out from the 1987-88 school year (between the final quarter of 1987 and the second quarter of 1988) to the 2020-21 school year (from the final quarter of 2020 to the second quarter of 2021). Consequently, the cohorts observed ranged from those

born in 1971, who turned 16 in 1987, to those born in 2003, who turned 17 during 2020.

As the variable was dichotomous, we used the statistical technique of logistic regression. The EPA is a panel survey, so it was possible to observe each individual repeatedly for a maximum of one and a half years (six quarters). Two more levels were added to the observation of each individual, consisting of the household (or their parents' characteristics) and the place where they lived, corresponding to the characteristics of their province or autonomous city. We also made a distinction between fixed effects (variables that do not change over time, such as gender, the characteristics of the family core or the place where they lived) and random effects (which move with individuals' personal lifeline, such as age).

With all this in mind, we set ourselves the following research question: "What characteristics of the geographical, family and personal context favour young people extending their formal education beyond that legally stipulated as compulsory before they reach the age of majority and what hinders them from doing so?"

Background

The so-called "Matthew effect" (Merton, 1968) - named after one of the Evangelists, from his telling of the Parable of the Talents (25: 14-30) - plays an important role in a professional career. Merton interpreted the parable as follows: the reward for achieving an objective after a major effort is not the same for everyone, but depends on the person's prior accomplishments, even if the task is collaborative. This maxim has been used in education to refer to the process, which is clearly identifiable from the earliest stages of schooling, whereby pupils receive different marks or comments for successfully completing the same objective depending on what they had previously achieved, in other words, depending on their "reputation". There is latent discrimination in a model in which, at the beginning of schooling, these educational expectations are strongly linked to pupils' social status (Rist, 1970), gender and migratory status. As a consequence, pupils from family cores with lower educational levels or from certain places of migration are pushed towards progress or stagnation in school according to variables of ascription that have

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nothing to do with their own effort or dedication, but rather with the stereotypes perceived by those involved in their education. If this is the case, the characteristics of the family core (as an approximation of social class) would be associated with 16 to 17-year-olds dropping out or continuing full-time education, and the interpretation of these cross-cutting patterns would have to be sought in the early stages of pupils' school careers.

A lot of research has shown the importance of family resources in prolonging education among young people (for example: Huang, Guo, Kim and Sherraden, 2010; Lochner and Monge-Naranjo, 2011). In the case of Spain, Casquel and Uriel (2009) found that household income has a positive influence on the probability of staying in post-compulsory education. Bernardi and Cebolla (2014) also highlighted the unequal incidence of educational attainment in educational pathways according to social class in Spain.

Some research has postulated that this effect can be interpreted as being down to different levels of parental involvement in schooling. However, recent studies have shown that this kind of social inequality is not explained by differences in values but by differences in resources (see Martín Criado and Gómez Bueno, 2017 for a summary and a further test of this hypothesis). All this translates into those having parents with low educational levels being more likely to drop out of school early (Jimerson, Egeland, Sroufe and Carlson, 2000; Kiernan and Mensah, 2011) and to have lower basic skills (Salmieri and Giancola, 2021). In contrast to this hypothesis, the OECD (2019) found that socio-economic status explains only a very small part of the skills demonstrated by pupils in the last year of compulsory schooling.

Another variable that has a similar effect is gender, which explains why boys perform worse than girls throughout their school careers (Hannum and Buchmann, 2005). It has been suggested that contemporary schooling meets female needs better than male needs, and females are therefore better adjusted to school expectations (Hascher and Hagenauer, 2010). Other explanations point to a radical shift in girls' educational aspirations, in anticipation of greater opportunities in the labour market in relation to a higher investment in their education (Hadjar, Krolak-Schewerdt, Priem and Glock, 2014).

Unfortunately, we do not have the complete histories of individuals' school careers, which would have allowed us to confirm or disprove this

process of early classification by class and gender. We therefore used as an approximation individuals' gender and the characteristics of their family core at the time we observed them - that is, when the individual was already 16 but not yet 18 years old.

Social class and gender variables are modified by the historical context that a particular cohort lives through during a given school year. Casquel and Uriel (2009) argued that high unemployment (as a conjunctural variable) is associated with staying in school. The circumstances of the labour market affect less advantaged classes to a much greater extent than they do more affluent classes (Meschi, Swaffield and Vignoles, 2011). In the United Kingdom, households living in rented accommodation and, in particular, those living in social housing (used as an indicator of vulnerability) have been found to be the most affected by the vagaries of the labour market (Tumino and Taylor, 2015).

In the specific case of Spain, Petrongolo and San Segundo (2002) showed that demand for post-compulsory education reacts positively to increases in youth unemployment (by influencing the opportunity cost of continuing education) and negatively to changes in adult unemployment (by lowering employment expectations as a result of investment in education).

When it comes to gender, the research shows that employment opportunities are better for boys, which is why they leave school earlier (Borgna and Struffolino, 2017).

According to this theoretical literature, schooling should be seen as an alternative, affordable activity in times of recession, while waiting for better times; on the contrary, in periods of growth, young people should prefer to find a, by necessity low-skilled, job that allows them to earn money and gain work experience to the option of continuing full-time education in a formal school institution. Operationally, and specifically in the case of Spain, we expected to see that the economic improvement at the beginning of the 21st century was associated with a fall in school enrolment among 16 to 17-year-olds and, on the contrary, that the economic crisis from 2008 onwards saw a parallel increase. We expected this, in conjunction with the above factors, to be much more common in lower-educated parental groups and among boys.

If pupils' social class and gender affect their whole school career from the beginning, and bearing in mind that we are looking at the population of 16 to 17-year-olds, confirmation or otherwise of this hypothesis should

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come from the association between the educational and migratory characteristics of their family core, their gender, and school enrolment rates at that age.

Several studies have shown that migration increases the probability of academic failure (Levels, Dronkers and Kraaykamp, 2008; Calero, Choi and Waisgrais, 2010) and of pupils dropping out of school at the end of compulsory education (Mora, 2010; Fernández-Macías et al., 2013; Serrano and Soler, 2014). With regards to migration, it should be borne in mind that ethnicity may hide distances in socio-economic origin (Hauser, Simmons and Pager, 2004). The lower proportion of young immigrants who continue to study is particularly evident among those who arrived in their current country when they were over 10 years of age, and these individuals are also found to react more intensely to economic cycles, especially males, who are less sensitive to the effects of the educational resources of the family core (Miyar-Busto, 2017).

International migration is not the only factor affecting the relationship between mobility and schooling in the early stages of post-compulsory education. Recent research has shown that mobility in Spain is now no longer characterized by young people with a low level of education, as it was in the past, but by highly educated people in search of job opportunities that match their training, as has been shown in Galicia (González-Laxe, Martín-Bermúdez and Martín-Palmero, 2013) or in Castilla y León (González Leonardo and López Gay, 2019). In view of these regional disparities, it should be noted that the labour market is closely related to the unequal distribution of educational attainment, a fact that serves as justification for different levels of investment in education depending on the region and would explain individual decisions about migrating between regions (López Bazo and Motellón, 2013).

The variables relating to migration or mobility were constructed by comparing place of birth and place of residence.

Schooling: number and pattern

Spain has recently experienced a demographic bonus, as classrooms emptied due to there being fewer 16 to 17-year-olds than in previous cohorts, which has not been compensated for by immigration. While between 1987-1988 and 1993-1994 the population of this age group was

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around 1.34 million, between 2005-2006 and 2009-2010 it was around 900,000 (see Figure I). In the first period, the number of students increased, because the school enrolment rate was also rising (from 78% to 83%), but thereafter, the fact that the rate continued to rise (to 86% in the 2003-2004 school year) did not compensate for the fall in the population of 16 to 17-year-olds, with the result that the number of students plummeted to almost 800,000.

This division between the potential student population and school enrolment rates is fundamental if we are to be able to predict the demand for education at this stage of schooling. In the short term, little can be done to change the total number of pupils aged 16 to 17, as this depends on the birth rate over 15 years ago and recent immigration, but effective public policies can have an impact on reducing early school dropout rates. To this end, highlighting the positive forces that bring the number of potential students and the number of actual students closer together, as well as the negative forces that drive them apart, is essential. In short, if early school leaving is to be significantly reduced, then resources and means must be made available to make schooling attractive to young people, at least until they reach the age of majority.

With this objective in mind, we sought to explain the stagnation in the school enrolment rates of 16 to 17-year-olds that occurred between the 1995-1996 and 2007-2008 school years, with a rate of around 85%, and how after increasing steadily it reached a maximum of 93% in the 2012-2013 school year and plateaued until the 2020-2021 school year, when it grew to 94.5%. This new stagnation in the enrolment rate did not prevent the total number of pupils from continuing to grow, as a result of the small demographic boom that had taken place between 1998 and 2008, caused by both natural and migratory growth.

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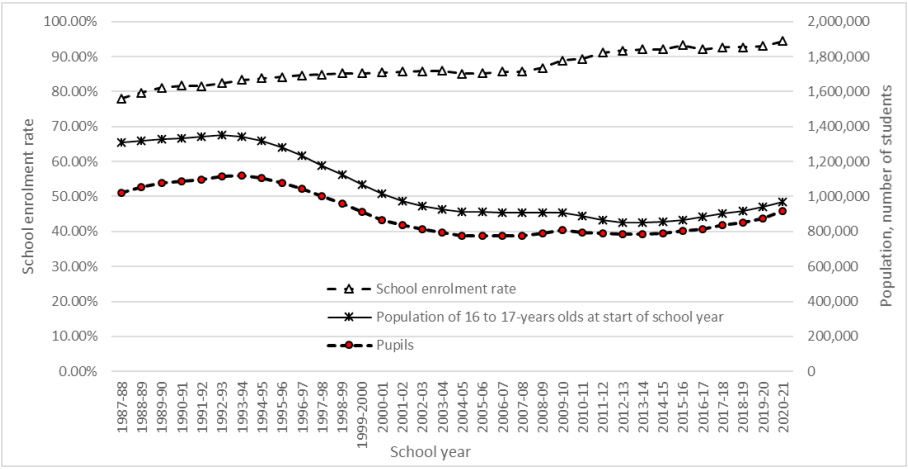
FIGURE 1. Population, number of students and school enrolment rate by school year.



Source: authors' own work

The most plausible hypothesis to explain this evolution is that school enrolment follows the labour market, since in the face of an employment crisis, the proportion of young people who remain in the education system increases and, on the contrary, a recovery in the labour market means a greater dropout rate, with pupils leaving school as soon as the law allows them to and taking up paid work which - inevitably, given their short school career - will be in jobs that require low qualifications, at most the school leaving certificate.

The COVID-19 pandemic and the resulting employment crisis led to a further increase in school enrolment rates of 16 to 17-year-olds, at least in the 2020-2021 school year (the latest for which we have data), and most probably also in the following school year, acting as leverage that will keep the rates close to an unprecedented 95%.

On the basis of this information, and before going further into the analysis of enrolment patterns, we believe it is very likely that the rate will continue to increase, at least in the coming years. From a pedagogical point of view, this is an opportunity to boost young people's interest in post-compulsory education, particularly vocational education. It will be necessary to fight against increases in classroom ratios, given that the population at this age will most likely continue to rise until the 2025-2026 school year, after which the cohorts of 16 to 17-year-olds will be

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steadily smaller, as a result of the fall in the birth rate that occurred in parallel with the economic crisis of 2009, provided that there is no increase in immigration to compensate for it. But we must also look at geographical patterns, as it seems that regional heterogeneity is another characteristic of Spain: for this reason, another of the aims of this research is to determine what this variability is associated with.

In research on the evolution of school enrolment rates of 16 to 17-year-olds by school year, simple age and gender data contain very valuable information. The school enrolment rate at age 17 was four percentage points lower than at 16 throughout the period studied. This can be interpreted as the drop-out rate between the two ages (although it could also be that at 16 pupils were still in Compulsory Secondary Education). The enrolment rate of girls is on average slightly more than two percentage points higher than that of boys. While the difference between the ages stayed stable throughout the period, the variable sex becomes gender when it is shown that it is related to the state of the economy: when the economy is growing, the enrolment of men in higher education tends to be curtailed to a greater extent, as they do not resist the siren song of an abundance of low-skilled jobs as well as women.

In the interests of lowering the early school leaving rate, it would be helpful to reduce as much as possible the almost four-point gap in enrolment between 16 and 17 years of age: in recent years, while the enrolment rate at 16 has stayed at 95%, at 17 years of age it has remained stable at 91%. Such high enrolment rates suggest that early school leaving rates will remain stable for the foreseeable future, especially as economic recovery usually reaches young people last.

Another way of combatting drop-out from the education system at this age would be to ensure that studying is not seen as being in opposition to a tempting paid job, but rather as a professional investment for the future. It should be noted that in the latest school year we analysed, the gaps between the genders and ages narrowed considerably, to 1.7 percentage points for both variables. It is difficult to predict whether these differences will be maintained after the health crisis.

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The migration situation

An additional factor that appears to be extraordinarily important in the prolongation of schooling is place of birth, a variable that we will go into more detail about in this section. The EPA began to record this variable in 1992 as a dichotomy (whether the person was born in Spain or in a different country), fortunately coinciding with the start of an unusual increase in international immigration. Consequently, the first year that information about this variable is available for is 1992-93. From then until the 1999-2000 school year, the proportion of the foreign-born population aged 16 to 17 remained at around 1.5%, rising thereafter to just over 8% between the 2008-2009 and 2010-2011 school years, and reaching a peak of 10.5% in the 2012-13 school year, after which the proportion declined slightly. In the final school years of the study, this indicator returned to 8%.

What is more, from the 1999-2000 academic year onwards, data are available on the continent where 16 to 17-year-olds were born (see Figure II). The proportion of 16 to 17-year-olds born in Spain decreased from 98.5% for the 1999-2000 academic year to a low of 89.5% in the 2012-13 academic year, rising again to 92% in the last two years of the study. The main foreign origin of 16 to 17-year-olds is the American continents (mainly from Latin America, although differentiation is not possible due to the low presence of other Americans), a percentage that reached 6% (academic year 2012-13) and is currently 3.6% (academic year 2020-21). The next largest group is of European origin, which has remained at 2% since the 2005-6 academic year. There are also people of African origin, the percentage of whom reached 2%, and from Asia or Oceania, with a maximum of 1% of 16 to 17-year-olds in the latest academic year of the study.

With regard to school enrolment rate by continent of birth, and bearing in mind that - statistically speaking - the smaller the sample volume, the wider the confidence interval, we observed that the school enrolment rate of those born in Spain was significantly higher than that of the rest of the groups (specifically, 91%), particularly compared to those born in Africa (79%), who were in turn not statistically different from those born in Asia or Oceania. From now on, these last two groups will therefore be considered in the same category. In contrast, those born in Europe (84%) and in the Americas (89%) were far enough away to be considered

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individually in terms of their school enrolment rates, the latter group most closely resembling those born in Spain.

In conclusion, place of birth, along with gender and the state of the economy, is a key variable when considering the probability of whether an individual will continue in education after the end of compulsory schooling by law. Another variable that is recorded by the EPA, the age at which the person arrived in Spain, further helps discern the effect of this important factor.

The next point to be discussed is therefore whether the age of arrival in Spain, as well as the continent where the person was born, may be a factor, as is suggested in some of the research discussed in the theoretical background. From our exploratory analysis, we agree that taking into consideration the individual's stage of schooling on arrival is essential. Those born in Spain had the highest probability of continuing their education at this age (91%); we found that they were followed by those who arrived before the compulsory schooling age of 6 (88%), and then those who arrived during primary education, between 6 and 11 years of age (86%). From this point of their life onwards, the older the age of arrival, the lower the probability of continuing in full-time education after finishing compulsory schooling: from 83% if they arrived at the age of 12 to 78% if they arrived at the age of 15. If the immigration was recent and beyond the age of compulsory schooling, the percentages were much lower: 72% if they had arrived at the age of 16 and 61% if they had arrived at the age of 17. Consequently, there is an interaction between place of birth and age of arrival, as Figure III shows.

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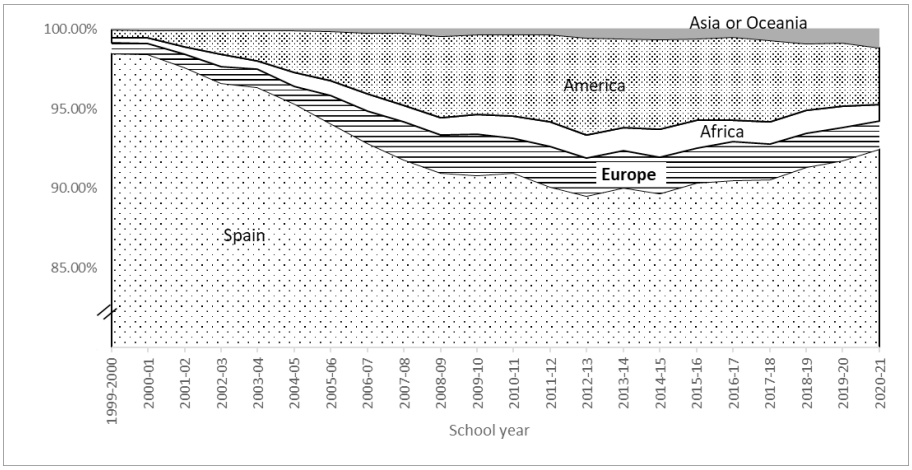
FIGURE II. Population aged 16 to 17 by place of birth



Source: authors' own work

The lowest probability of continuing in full-time education was found among those born in Europe, Africa, Asia or Oceania who had arrived in Spain at the age of 16 or 17 (around 55% were continuing in education); in other words, those who had just arrived from these regions. The likelihood of those from the same geographical origins but who had arrived a little earlier, specifically during the age of compulsory secondary education (12 to 15 years of age), continuing in full-time education was considerably higher (i.e. they were 20 percentual points more likely), with a school enrolment rate of around 75% at 16 to 17 years of age, very close to those who were born in the American continents and who had just arrived in Spain. Some 80% of those born in Africa, Asia or Oceania who arrived during primary education (7 to 11 years of age) were still in school at 16 to 17 years of age.

These differences depending on place of origin and age of arrival were reflected in a heterogeneous group of immigrants with similar behaviour (85% school enrolment) made up of those born in Europe who arrived before the age of 12, those born in Africa, Asia or Oceania who arrived during the age of (non-compulsory) infant education, or those born in the Americas who arrived before the age of 16. Finally, those from the American continents who arrived before the age of starting compulsory

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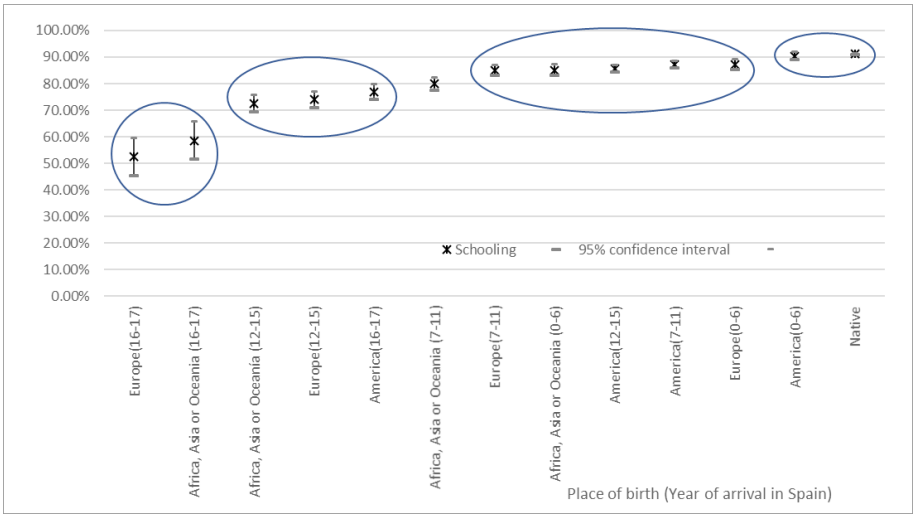
schooling and those born in Spain were five percentage points more likely to continue in full-time education – with no statistically significant differences found (Figure III).

As a final observation, it should be noted that we evaluated this variable not only for individuals (as we have just described) but also by family core (incorporating the migratory status of the father and mother) and by geography (analysing the effect of the concentration of international immigration by province). These results are reported below.

In fact, immigration status is the final variable we only analysed with panel data, in other words, by analysing observations nested in individuals. From this point onwards, we added a new level, namely that of the cohabiting household.

FIGURE III. Pattern of schooling by place of birth and age of arrival



Source: authors' own work

Note: values with no significant difference among them, with a 95% confidence interval, are circled.

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The characteristics of the family core: education and migration

From 1999 onwards, the EPA makes it easier to add the parents' characteristics to the interpretative model of the probability of 16 to 17-year-olds being in full-time education. We therefore continued to work with the cohorts and school years from the previous section, having studied individuals' continent of origin and stage of life when they arrived. The first cohort for which we have this complete, new information is of those born in 1983, who turned 16 during 1999 (the 1999-2000 school year). In this second phase of the research, we therefore combined information about individuals with information about households (the latter does not change over time, since in the EPA an individual is always part of the same household unit while they remain under observation). The household is a hierarchical level above that of individuals and observations, since several siblings (or young people who are not necessarily brothers and sisters) can live together under the same roof, and thus enjoy or endure similar family core characteristics. The sample we were now working with consisted of 227,532 observations, involving 169,201 individuals in 87,579 households.

The first variable to be investigated at the third level was the household cohabitation situation, defined as living with at least one parent. The description of the categories of the variable is accompanied by the probability of being in formal education, once the effects of age, gender, school year and migration status have been isolated. In almost 2% of the households, the young person did not live with either their father or mother, and in these households the probability of continuing in full-time education at the age of 16 to 17 was significantly lower than in the rest of the households (specifically, ten percentage points lower). Outside this category, no significant differences were detected for this indicator; in other words, whether the individual lived in a two-parent household (as 80% of the sample did) or in a single-parent household (3% with the father and 15% with the mother) did not make any difference to the probability of them remaining at school. We therefore concluded that living outside of the family core is associated with a lower probability of staying at school, but whether the core is one or two parents is not significantly important.

At this point, we added the migration factor at household level, based on the mother or father's place of birth, and combined this information

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with the individual's immigration status. Here we were able to distinguish sufficiently reliably and validly between: 1) those households in which both parents, or one parent in the case of single-parent families, were born in Spain; 2) households where both parents, or one parent in the case of single-parent families, were not born in Spain; or, 3) mixed households, with one parent born in Spain and one not. Again, we found that only living outside any sort of family core was associated with a lower probability of continuing in formal education, while all the other categories of the household's migration status made no difference.

After eliminating both the type of family core (unless the individual lived with neither their mother or their father) and the migratory situation of the family core from the explanatory model of the school enrolment rate of 16 to 17-year-olds, we then tested the effect of the family core's level of education (still at the household level). In the previous exploratory analysis, we identified six categories where the probability of individuals continuing in education was identical: 1) households in which one of the parents had a basic education (minimum compulsory education at the most); 2) two-parent households in which both parents had a basic education (minimum compulsory education at the most); 3) households where one or both parents had vocational or other training; 4) two-parent households in which one of them had the baccalaureate or, in the case of single-parent households, the one parent had the baccalaureate; 5) two-parent households in which one of them had a university education or, in the case of single-parent households, the one parent had a university education; and, finally, 6) two-parent households in which both of them had a university education. Our conclusion was that the parents' level of education was not significantly dissociated from the probability of their children continuing to be in full-time education. We therefore ruled out this hypothesis, which we described in the theoretical background.

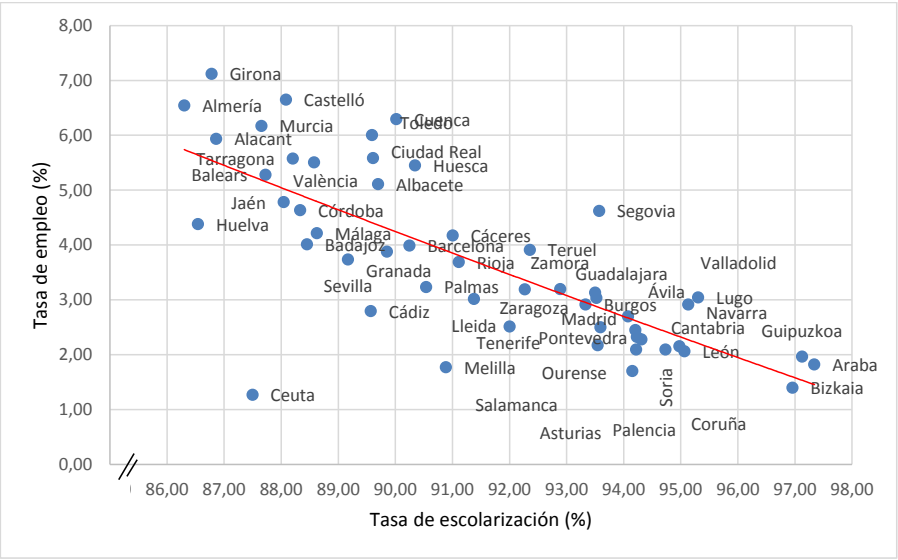
None of the variables we analysed at the household level explained the probability of 16 to 17-year-olds continuing in full-time education, so, for the sake of the simplicity of the explanatory model, we were able to dispense with practically all of them. The only exception was individuals who lived with neither of their parents, whose rate of enrolment in school at these ages was significantly lower in relation to single- or two-parent households. These individuals represented 2% of the total. It was not possible to clarify the specific personal circumstances of this group with data from the EPA.

The introduction of the household to the explanatory model of the probability of 16 to 17-year-olds continuing in full-time education disrupted the interpretation of the variables we had been considering so far to a certain extent: when we applied the three-level hierarchical model, in which observations were of individuals and of these individuals within households, the probability of an individual aged 16 to 17 continuing in full-time education ceased to be significantly related to their age or their sex. Indeed, the enrolment rate increased in each school year, with the sole exception of the period of economic upswing (2004-2005 to 2007-2008), so only the latter deserved consideration in the final explanation. Thus, the full force of gender, age and almost all the periods of time were diluted in favour of the other variables in the explanatory model, namely - at this stage of the research - immigration and the fact of not living with any member of the family core. And so we come to the fourth level: the province where the individual lived.

Does where individuals live affect the probability of them continuing in education?

Geographical differences depending on the province where individuals lived were evident in the school enrolment rates of 16 to 17-year-olds. At one extreme was the Basque Country, with an enrolment rate of 97%, and at the other, the provinces of Almería and Huelva, at 86%. The description of these patterns should be complemented with explanatory analysis that substitutes this ratio for one or more characteristics of each province, such as, based on the background information above, the employment rate of 16 to 17-year-olds (following the hypothesis that the higher the employment rate at this age, the lower the school enrolment rate), the unemployment rate for the same age group (the higher the unemployment rate, the higher the school enrolment rate), the proportion of working adults with secondary or higher education (the higher qualified the labour market is, the higher the level of post-compulsory schooling), or the proportion of the population born outside Spain (the higher the amount of immigration, the lower the level of post-compulsory schooling). While the first and third hypotheses were confirmed, the other two were disproved on analysis.

FIGURE IV. Employment rate and school enrolment rate by province



Source: authors' own work

The employment rate by province of the population that was legally able to be part of the labour market but had not yet reached the age of majority (18) was very low, ranging from the lowest in Ceuta (1.27%) to the highest in the province of Girona (7.12%). At the aggregate level (Figure IV), the correlation between school enrolment and employment rates of 16 to 17-year-olds in the provinces was -0.75, which confirmed the strong relationship between the two variables. This also suggested that part of the explanation for the low school enrolment rate of 16 to 17-year-olds was that it was relatively easy for young people of this age group to find work. Thus, for example, the provinces of Girona, Almería, Castelló, Murcia and Alacant combined the lowest school enrolment rates with the highest employment rates at these ages and, on the contrary, in the provinces of Gipuzkoa, Araba and Bizkaia, an employment rate below 2% was linked to a school enrolment rate of around 97%.

In contrast, the ratios of unemployed 16 to 17-year-olds and those born outside Spain did not correlate with school enrolment rates at the same

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age, even at the aggregate level. In short, while reinforcing the hypothesis that the scope of post-compulsory education was symmetrical with that of employment, any association between high levels of immigration or unemployment pressure with low school enrolment rates was disproved.

In addition, we incorporated another factor that gave good results, namely the ratio of 26- to 30-year-olds with secondary or higher education in employment, which we used as an indicator of the degree of qualification required in a region's labour market, and which correlated with the school enrolment rate of 16 to 17-year-olds with an index of 0.81. By combining these two variables (employment and qualification for the labour market) we obtained a model that gave a much better estimation of school enrolment rates of 16 to 17-year-olds: if we substituted the place where individuals lived for these two indicators, the correlation coefficient between the rate by province and the estimated rates (in a multilevel model) rose to 0.84. In short, the higher the low-skilled youth employment, the higher the school dropout rate; youth unemployment and the amount of immigration were practically irrelevant.

Conclusions

We have already noted that it was not possible to obtain information about infant and primary school years and other education prior to 16 using this data source and methodology, so we only associated variables once these stages had ended, once schooling ceased to be legally compulsory. In other words, we only ascertained or disproved whether the school enrolment rate of 16 to 17-year-olds was linked to certain variables of ascription (which do not change over time), such as gender, the characteristics of the family core or place of birth (together with the year of arrival in Spain) or context (school year or province), but we were not able to analyse school careers before the period of observation.

Indeed, compulsory schooling in Spain, as in the vast majority of European countries, runs from the school year during which children reach the age of 6 to the age of 15. Thus, at the age of 16, it is possible to leave school and enter the labour market. It can therefore be said that those who continue to study do so voluntarily. Hence the social significance of school enrolment rates among 16 to 17-year-olds.

The research led to a model with four levels of analysis, the variables significantly associated with the probability of school enrolment of 16 to 17-year-olds being selected for each. Focusing on the school years at the beginning of the 21st century in Spain, the sample was made up of 227,532 quarterly observations of 169,201 people in 87,579 households, living in 52 regions.

Extending full-time education beyond the compulsory school age is currently very similar for men and women. It would be desirable for the education system to meet this generally high demand and to promote success in achieving a secondary education qualification, thus reducing early school leaving as far as possible. Personally, we believe that there is enough information to define the most suitable school places, even if there are not enough resources (financial and human) to implement effective policies.

We have also shown that gender and class are not an impediment to prolonging schooling at this age, although this does not mean that both sexes or all social groups choose to study the same thing or have the same probability of success.

It has become clear that the type of labour market is a vitally important factor in the school enrolment rate of 16 to 17-year-olds in terms of both time and geography. Indeed, the periods and areas where low-skilled jobs were abundant coincided with the times and places where schooling at this age was lower.

In short, the two variables with the greatest sensitivity to school enrolment rate of 16 to 17-year-olds are: pupils living with at least one of their parents (with no significant difference between single and two-parent households) and migration status (with age of arrival). The probability of continuing in full-time education is greater the earlier the child enters the education system, and there is a greater disadvantage for immigrants born in Europe or Africa compared to those born in the Americas. Although the variables referring to the composition of the family core were not found to be significant in the school enrolment rate of 16 to 17-year-olds and there was no difference according to the level of education or origin of the family core, the probability of continuing in full-time education was lower for those who did not live with either their father or their mother. Once again, we interpret these results as a confirmation of the key importance of the family environment and the need for public policies that can alleviate deficits in this regard.

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Also included, though to a lesser extent, are the employment context and qualifications, both in terms of time and geography. All the other variables studied are not significant in explaining the school enrolment rate of 16 to 17-year-olds.

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Grants programme and tuition fees policy in the Spanish public university system: is it really effective?

La política de becas y precios públicos en el sistema universitario español, ¿es realmente eficaz?

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Abstract:

University policy plays a fundamental role in reducing social inequalities. The purpose of this paper is to assess whether the strategy of geographical expansion of universities, in addition to the financial aid and tuition fees policy in Spain guarantee that people with insufficient economic resources can access and complete university studies. To do this, we analysed the territorial proximity of the university offer to the place of residence of potential students, using the Population Register, and compared the income thresholds for access to the state grants programme with the median and poverty line of the household income distribution, using the *Statistics on Income and Living Conditions*. The analysis reveals that the wide geographical spread of public university *campuse*s facilitates access to higher education for a significant percentage of young people. However, the study also shows that while the tuition fee exemption grant is available to students from any household ranging from vulnerable to those with incomes close to the median, other grants, which are essential to avoid student dropout, do not even reach all households at risk of poverty. Moreover, their average amount is insufficient to compensate for the opportunity cost of studying. This

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result contrasts with a tuition fees policy that subsidises the enrolment of all students, including those living in middle- and high-income households. This subsidy also presents notable differences between autonomous regions that are not justified by the divergences in the income levels of households in the region. The paper concludes by pointing out the advisability of a joint review of the current grants programme and tuition fees policy.

Key words: University policy, university grants, tuition fees, social inequalities, poverty

Resumen

La política universitaria juega un papel fundamental en la reducción de las desigualdades sociales. El propósito de este trabajo es evaluar si la estrategia de expansión geográfica de la oferta educativa, la política de becas y ayudas y el sistema de precios públicos en España garantizan que las personas con recursos económicos insuficientes puedan acceder y culminar los estudios universitarios. Para ello, se analiza la proximidad territorial de la oferta al lugar de residencia de los estudiantes potenciales de acuerdo con la distribución de la población y se comparan los umbrales de ingresos para acceder al sistema de becas estatal con la mediana y la línea de pobreza de la distribución de la renta entre los hogares a partir de la *Encuesta de Condiciones de Vida*. El análisis revela que el amplio despliegue geográfico de *campus* públicos facilita el acceso a la educación superior a un porcentaje notable de la población joven. Sin embargo, el estudio muestra que, mientras que de la beca de exención de matrícula pueden beneficiarse desde los estudiantes que residen en hogares vulnerables hasta aquellos con rentas cercanas a la mediana, el resto de ayudas, imprescindibles para evitar el abandono, no alcanza siquiera a todos los hogares en riesgo de pobreza, y su importe medio es insuficiente para compensar el coste de oportunidad de estudiar. Este resultado contrasta con una política de precios públicos que subvenciona la matrícula a todos los estudiantes, incluidos los que residen en hogares con rentas medias y altas. Una subvención que, además, presenta notables diferencias por comunidad autónoma que no se justifican por las divergencias en los niveles de renta de los hogares de la región. Se concluye señalando la conveniencia de una revisión conjunta del actual sistema de becas y precios públicos.

Palabras clave: política universitaria, becas universitarias, tasas universitarias, desigualdades sociales, pobreza

Introduction

There are many studies that support the benefits of higher education in reducing social inequalities. Firstly, they point out that higher education broadens the opportunities for better wages and working conditions (Bartscher, Kuhn & Schularick, 2020). In addition, the effort and personal achievement of completing a degree neutralises the discriminatory effects of social origin which continue to affect the rest of the population (Fachelli, Torrents y Navarro-Cendejas, 2014). Secondly, higher education reduces the likelihood of downward mobility on the social ladder, especially in adverse economic contexts. Higher educated individuals find it easier to hold on during these periods, as they typically earn higher incomes and accumulate more wealth (Pastor y Pérez, 2019; Cantó & Ruiz, 2015). In fact, people with higher education tend to be at the top of the income distribution (Pastor y Pérez, 2019). There are fewer unemployed higher educated people as, in general, they enjoy better working conditions, lower rates of precariousness and lower average periods of unemployment, since they develop a better job search strategy and have more opportunities due to their qualifications (Goerlich & Miñano, 2018). Higher education is thus submitted as a resilience factor in the face of adversity, reducing the risk of poverty and social exclusion.

Improved education also has very positive effects on other facets of wellbeing (Münich & Psacharopoulos, 2018; Pastor y Pérez, 2019) and, through intergenerational transmission, extends its effects over time, because, as Pastor and Pérez (2019, p.209) and the OECD (2018, p.14) point out, children with higher educated parents, *ceteris paribus*, are more likely to achieve this level of education as well. Thus, the more university graduates a society has, the higher the proportion of people who will receive higher education in future generations.

On this basis, it is reasonable that the OECD (2018) identifies actions in education, and in particular in higher education, as the first key policy to reduce inequalities. Such actions should ensure equal opportunities in access and should prevent the risk of university dropout for economic reasons. Thus, for example, a wide network of university *campuses* can serve to geographically approximate the educational offer to the population. In addition, an appropriate undergraduate pricing policy combined with an effective grants programme can reduce the cost of tuition fees. Finally, a programme of additional financial aid to pay the

costs of pursuing studies (transport, accommodation, meals or study materials) or to compensate for the potential lack of contribution to the family economy by devoting time to studies, can prevent university dropout (Hernández y Pérez, 2019).

Despite the consensus on the desirability of these measures, there is little research quantifying whether the policies adopted are sufficient, whether they have any unintended side-effects, and even whether they are more or less efficient than others. In this regard, it is worth highlighting the following three studies. The first is the AIRef (2019) report which assesses the effectiveness of the state grants programme for equal opportunities using data from the Integrated University Information System. The second is the research by Valdés (2018) which not only synthesises the results of Spanish studies on the impact of grants on enrolment and academic performance, but also analyses the social background of students on the basis of average family income and income thresholds for receiving financial aid. Finally, the paper by Pérez-Esparrells and Jodar (2017) addresses the spatial analysis of differences in tuition fees across Spanish regions.

Our aim is to verify whether the actions designed to promote university education in Spain guarantee that people with insufficient economic resources can access and complete these studies. This requires an analysis of the Spanish Public University System, as the prices of private universities, logically, deter potential students with lower incomes. To do this, the paper attempts to answer three main questions. First, to find out whether there is a relationship between grant recipients and household income level. Second, the role of the geographical extension of the public university *campus* network is analysed in order to assess geographical equity in access to higher education. Finally, the study focuses on the public pricing policy and the state grants programme to evaluate the adequacy of both the former and the maximum income thresholds for accessing grants, given the current income distribution in Spain.

An exhaustive analysis would also require a review of the student grants offered by the different autonomous regions and universities, but this would take us beyond the initial purpose. Moreover, most of these institutions develop a fairly similar strategy and the amounts allocated to them are very modest in relation to the state grants programme. For this reason, we will only focus on the General State Administration

(Administración General del Estado -AGE-)[1] grants and, occasionally, we will refer to some of the measures developed by some regions to complement the national plan.

With respect to previous research, we contribute to understanding the association between grant beneficiaries and household income levels by using information from a single statistical source, the Spanish *Statistics on Income and Living Conditions* (SILC) form the National Statistics Institute (Instituto Nacional de Estadística -INE-). We also use this source to establish the conditions for an appropriate comparison of household income with both poverty thresholds and the eligibility criteria in order to be a grant-holder. We also estimate the percentage of young people who have geographical access to higher education based on their distribution by metropolitan areas according to the *Population Register* (Padrón Continuo de Habitantes). From a spatial perspective, we also analyse the relationship between the average cost of enrolment and regional income.

The structure of this paper is as follows. After this introduction, the first section describes the methodology used. The second section is devoted to the presentation of the results obtained in order to answer the three questions raised. Finally, the paper closes with a discussion of the results and final reflections.

Methodology

Data

The main statistical source used in the paper is the Spanish SILC. In this survey, the information on household disposable income is obtained by combining the information provided by the respondent with files from the Tax Agency (Agencia Tributaria), which is also the source used by the AGE for awarding grants. The year prior to the interview represents the reference period for this variable. As the most recent available survey at the time of this study was the SILC-2020, the analysis has been conducted for the academic year 2020/21. The income period used for the awarding

[1] Common to all of Spain, except for the Basque Country, which has its own grants programme.

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of grants in that academic year is 2019, the same as the one provided by the SILC-2020.

On one occasion, we also use information from the *Population Register* (1 January 2020), from which population data at a municipal level has been drawn to calculate the population by metropolitan areas and to evaluate geographical equity in access to higher education.

Procedure

The procedure followed to answer each of the questions raised is as follows:

Grant recipients and household income level

To evaluate this association, the distribution of young university students, grant recipients, and amount received by household income level has been analysed graphically. The income concept used is that of Disposable Household Income (DHI) per Equivalent Consumption Unit (ECU). This is the standard way in which EUROSTAT and the OECD correct for the existence of economies of scale derived from household composition. The modified OECD scale, which gives a weight of one to the first adult, 0.5 to other adults and 0.3 to children under 14 years of age, was used to obtain the DHI per ECU.

Extension of the public university *campus* network

The Spanish Public University System has 50 universities (one of which is open – the UNED- and two of which are special -the UIMP and the Universidad Internacional de Andalucía-). The information on degrees offered and the list of the different university *campuses* has been drawn from the university websites. With this information, we first drew up a map showing the location of each one of them, as well as the *campuses* created in those provinces that do not have their own university. Secondly, to asses proximity in terms of population, we have used the

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list of metropolitan areas and provincial capitals as a starting point. As there is no official delimitation of metropolitan areas in Spain, we have used the areas estimated by Feria and Martínez[2] (2016) based on 2011 census data on residence-work mobility. This is a delimitation that is consistent with our purposes as we consider the university *campuses* to be the students' place of work. From this list we have selected the metropolitan areas and provincial capitals in which there is at least one *campus* offering bachelor's degrees in a minimum of three branches of knowledge. The assessment was carried out by calculating the percentage of young people between 18 and 24 years of age residing in these areas out of the national total according to the *Population Register*.

The public pricing policy and the state grants programme

Tuition fees are considered as public prices according to Law 8/1989, of 13 April, on Fees and Public Prices (Tasas y Precios Públicos). This means that they must, at least, cover the cost of carrying out the activity. However, the Law also states that lower prices can be set when there are reasons that make it advisable to do so. In accordance with Organic Law 6/2001, of 21 December, on universities, modified by Royal Decree-Law 14/2012, of 20 April, these prices are set by each autonomous region, which, according to its criteria, also establishes the number of the different practical levels (experimentalidad), then assigns a practical level for each degree and, finally, determines the price increase between each practical level and between the first and successive registrations. The price per credit does not depend on the economic situation of the student but on the region where he/she lives, the practical level of degree and the number of times he/she has enrolled for the same subject. In order to facilitate the comparison between regions, the analysis of equity from a geographical point of view has been conducted using the average price per credit for first-time enrolment in Bachelor's degrees calculated by the Ministry of Universities (see annex). The analysis has been completed with a comparison regarding tuition fees burden for families, calculating

[2] We are grateful to the authors for the information provided on the municipalities that make up each metropolitan area.

the proportion that this cost represents, based on the average price, out of the median DHI per ECU in each region.

In order to find out whether the maximum income thresholds for accessing grants are appropriate, their level has been compared with the median DHI per ECU. These thresholds can be found in table I with the corresponding grant modalities. If the household income is below *threshold 3* (maximum), it can obtain tuition fee exemption and an amount between €50 and €125 linked to academy excellence. If it is below *threshold 2* (medium), the applicant can also receive a variable amount that results from the weighting of the average academic record of his/her transcript and his/her family income (minimum €60), and if the student needs to reside far from the family home, a fixed amount of €1,600 is awarded. Finally, if the household income does not reach *threshold 1* (minimum), the AGE adds a fixed amount to the tuition fee compensation, which is equal to €1,700 in the academic year 2020/21. Without going into further details, this brief description of the programme shows that it is not a simple scheme.

TABLE I. AGE need-based grants according to DHI

DHI thresholds, academic year t/t+1	**Type of grants**
DHI $_{\text{(year t-1)}}$ < *Threshold 1* (minimum)	Tuition fee exemption Fixed amount associated with income Fixed amount associated with residence, if applicable Variable amount linked to income and academic record Amount linked to academic excellence
***Threshold 1* < DHI $_{\text{(year t-1)}}$ < *Threshold 2* (medium)**	Tuition fee exemption Fixed amount associated with residence, if applicable Variable amount linked to income and academic record Amount linked to academic excellence
***Threshold 2* < DHI $_{\text{(year t-1)}}$ < *Threshold 3* (maximum)**	Tuition fee exemption Amount linked to academic excellence

Source: Royal Decree 1721/2017, of 21 December.

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Each year, the Secretary of State for Education publishes a resolution updating the applicable amounts corresponding to each threshold, depending on the number of household members, for that academic year. The Resolution of 31 July 2020 contains the thresholds for the academic year 2020/21.

Our analysis has been undertaken for the most common household sizes, between one and four members (94.1% of households in the survey). Furthermore, for the sake of comparison, we have expressed the AGE income thresholds in terms of ECU. For this purpose, the OECD equivalence scale has again been used, assuming on this occasion that all household members are over 14 years of age. In this way, the difference obtained between the two variables will always be the minimum possible.

The analysis starts with the comparison of income *thresholds 3* which give access to tuition fee exemption, followed by that of *thresholds 1 and 2* which give access to the aid programme for lower-income students. In the latter case, these thresholds are also compared with the cut-off established to consider a household to be at risk of poverty, that is, when the income is less than 60% of the median DHI per ECU.

Results

Grant recipients and household income level

Figure I shows the proportion of young university students out of the total number of population aged 18 to 24, distributed by decile according to the level of DHI per ECU. It also displays the proportion of grant recipients out of the total number of university students in each decile and, finally, the median amount received. Apart from the general, academic and wealth requirements for grants eligibility from the AGE, the student's household income must not exceed the aforementioned thresholds. Figure I also shows the decile to which these thresholds belong for the academic year 2020/21[3].

In this figure, we can observe a positive relationship between income and the percentage of university students. However, the association between income level and the proportion of students on a grant is very limited, and only appears from the fifth decile onwards. In fact, precisely

[3] As income is expressed in terms of ECU, AGE income thresholds for one-member households have been selected (€8,422; €13,236 and €14,112) in order to be able to compare with income distribution in the figure.

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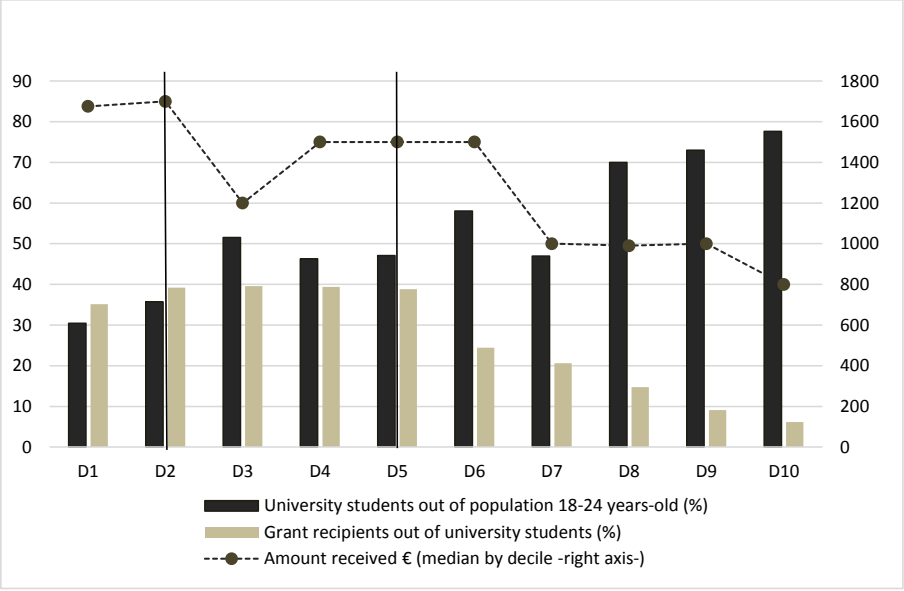
in the left tail of the income distribution (deciles one to three) there is no clear relationship between the two variables. We can also observe that the fact that the income thresholds are in the second decile (*threshold 1*) or in the fifth decile (*threshold 2 and threshold 3*) does not seem to result in an appreciable correction in the percentage of beneficiaries, nor in the amount received.

FIGURE I. Proportion of young university students, grant recipients and median amount received by income deciles

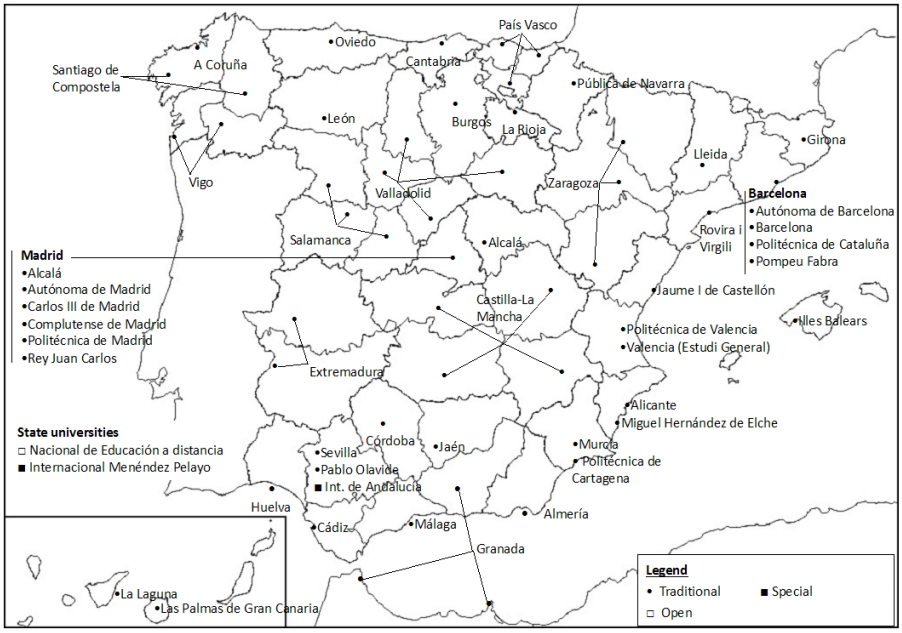


Source: Own calculations based on Spanish-SILC microdata (2020).

Extension of the public university *campus* network

Figure II shows the location of each of the Spanish public universities and also indicates the universities that have created a *campus* in those provinces that do not have their own institution. The map reveals that there is at least one *campus* in each province, including the two autonomous cities of Ceuta and Melilla.

FIGURE II. Spanish public universities



Source: Own elaboration based on infographic on the Ministry of Universities website.

As explained in the methodology, in order to estimate the real proximity of potential students to the university, we calculate an impact indicator regarding the spatial distribution of the *campuses* on the population by metropolitan areas. This indicator is the percentage of young people between 18 and 24 years of age living in a municipality or metropolitan area where there is at least one *campus* offering bachelor's degrees in a minimum of three branches of knowledge. According to the *Population Register* (1 January 2020), this percentage is equal to 72.45%.

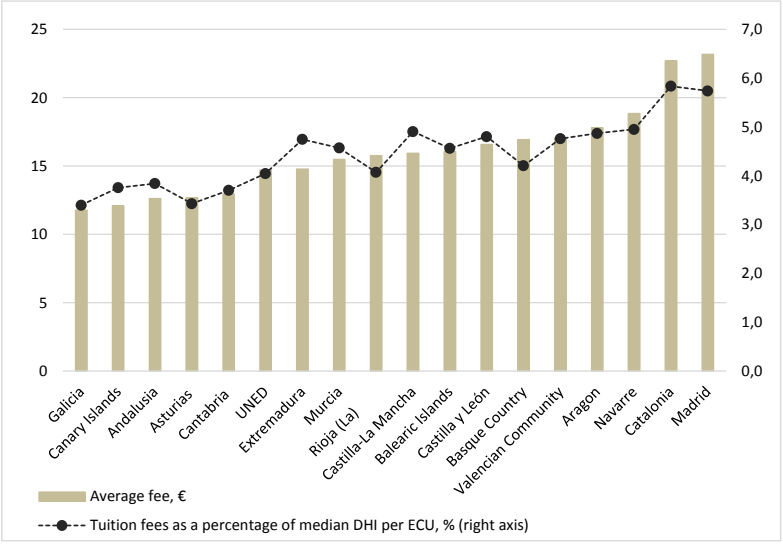
The public pricing policy and the state grants programme

The results of the equity analysis of public prices from a geographical point of view are shown in figure III. It can be seen that the tuition cost

for a full academic year (60 credits) ranges from €706.8 in Galicia to €1,390.2 in Madrid, which means that studying in this region costs 97% more than in Galicia.

In the figure we can also observe an indicator of the effort involved for households in paying tuition fees, approximated as the proportion that this cost represents out of the median DHI per ECU in each region[4]. To adjust the estimation correctly, the medians have not been calculated on the complete income distribution of all households but only of those households that do have to pay the tuition fees because they do not meet eligibility economic criteria, i.e., households with income per ECU above *threshold 3*.

FIGURE III. Average price of initial enrolment fee for bachelor's degrees and financial burden on DHI per UCE (median) in each region. Academic year 2020/21



* In the case of UNED, the calculation is based on the national median.

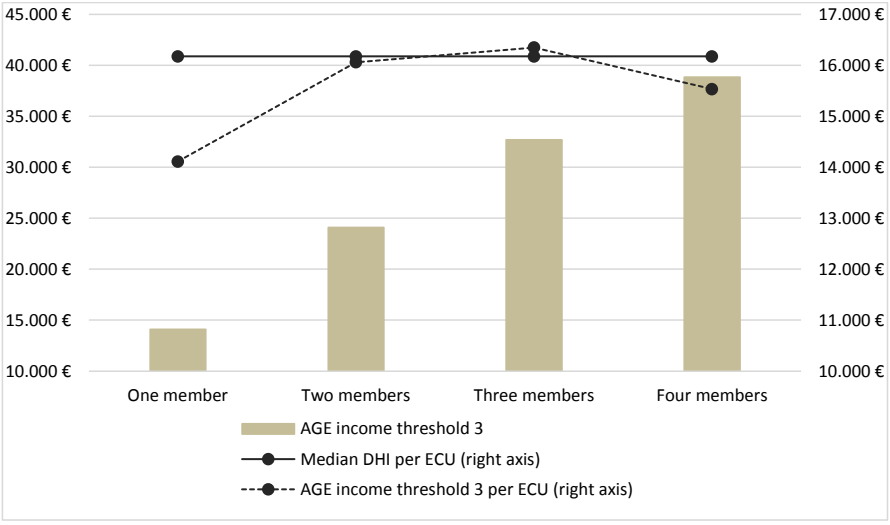
Source: Ministry of Universities and own calculations based on Spanish-SILC microdata (2020).

[4] The comparison of median income and tuition fees is appropriate because the majority of students have their usual residence in the same region in which they study (according to the Ministry of Universities, in the academic year 2018/19, more than 82%, except in Castilla y León, Madrid and La Rioja where the percentage is 72%).

Obviously, if the tuition cost were proportional to the median regional income, we would expect a straight line in figure III, which is not the case. Moreover, the positive and significant value of the Pearson correlation coefficient, which is 65%, calculated between the average credit price and the median DHI per ECU, confirms this assessment.

Regarding the adequacy of the thresholds for access to grants, figure IV presents the income *thresholds 3* for obtaining tuition fee exemption by household size, from one- to four-members, established by the AGE for the academic year 2020/21, also expressed in terms of ECU. The median household income per ECU in 2019 is also presented.

FIGURE IV. AGE income threshold 3 by household size. Academic year 2020/21



Source: Resolution of 31 July 2020 Secretary of State for Education and own calculations based on Spanish-SILC microdata (2020).

It can be observed that the AGE threshold per ECU is not stable and that, for one- and four-member households, it is below the median income, at 14 and four per cent, respectively.

The income *thresholds 1 and 2* for additional grants by household size are shown in figure V. They are also displayed in terms of ECU. It can be seen that *threshold 1* is stable this time, but it is always below the

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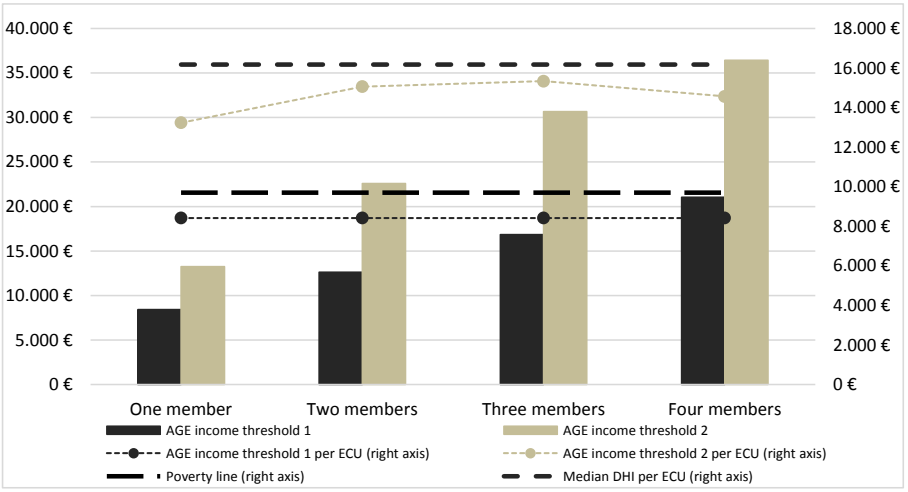
threshold for a household to be considered at risk of poverty, by more than 13%. *Threshold 2*, however, varies again. It is around the level of median income for two- and three-member households, while for one- and four-member households it is 18% and 10% lower, respectively.

FIGURE V. AGE income thresholds 1 and 2 by household size. Academic year 2020/21



Source: Resolution of 31 July 2020 Secretary of State for Education and own calculations based on Spanish-SILC microdata (2020).

In some regions, to mitigate the shortage of resources faced by university students whose household income is below *threshold 1*, regional governments launch their own grants programmes. Among them, the *salary grants* of the Valencian Community stand out for the support amount of €6,000 for each student who meets the requirements[5]. The aim of these grants is to alleviate the situation of households in more precarious conditions by increasing the amounts received. For this

[5] They stand out because, after reviewing the websites of the regional governments, we have been able to confirm that less than 50% of regions award need-based grants, and when they do so, the amount does not exceed €3,000. For more details about *salary grants*, see the Resolution of 9 September 2020 of the Regional Ministry for Innovation, Universities, Science and Digital Society (Conselleria de Innovación, Universidades, Ciencia y Sociedad Digital).

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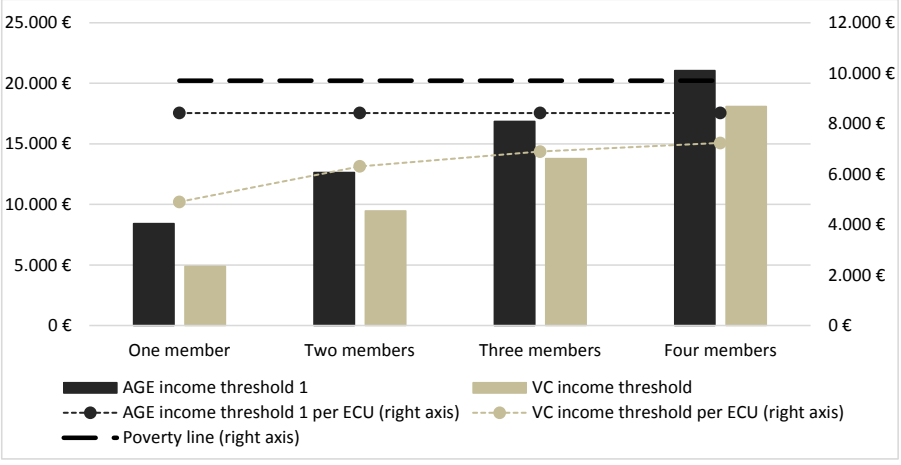
reason, it is not incompatible with the fixed-amount grant from the AGE. In the event that the student is a beneficiary of the latter, he/she will receive any remaining amount needed to reach €6,000, as a regional supplement.

However, the income requirement for these *salary grants* is stricter than at the national level, as can be seen in figure VI. It can also be seen that, in terms of ECU, the threshold established for the *salary grant* is not independent of the size of the household, unlike the AGE *thresholds 1* which is always the same. Inexplicably, the cut-off income in the Valencian Community is more severe (lower) as the number of household members decreases.

FIGURE VI. AGE income thresholds 1 and salary grant thresholds in the Valencian Community (VC) by household size. Academic year 2020/21



Source: Resolution of 31 July 2020 Secretary of State for Education and own calculations based on Spanish-SILC microdata (2020).

Discussion

Grant recipients and household income level

If university policy measures to promote equity were really effective, the number of students taking courses and completing higher education would be independent of the economic level of their households. However, this is not the case in Spain, even nowadays, as Pastor and Pérez (2019, p.209) recently show with data from the latest available Population Census of 2011. They use a probit model to estimate the degree of dependency, in particular in relation to the level of household wealth (basically, whether or not the household owns a dwelling). Our study, based on the SILC-2020, allows us to analyse this relationship almost ten years later using household disposable income, a variable that is more accurate than that of wealth limited to home ownership. Furthermore, we analyse young people studying at university at the time of the survey and not, like Pastor and Pérez, a population that has completed their studies. Lastly, we can distinguish whether or not they are grant beneficiaries.

Despite this, figure I still shows an increasing relationship between income and the percentage of university students. It may be surprising that from the fifth decile onwards, where no one should receive need-based grants, the SILC observes that there are still beneficiaries and that, moreover, the median amount of support does not clearly decrease in the higher income deciles. However, this can be explained by the fact that the survey has allocated all types of grants (need-based) and scholarships (merit-based) to a single variable. This means that, for example, Erasmus scholarships or collaboration scholarships, awarded independently of the household income level, have also been included here.

This would justify the existence of support beneficiaries in the right tail of the distribution in figure I, but not what happens in the left tail, in the lower income deciles. The percentage of beneficiaries does not increase appreciably as income decreases, although almost all the funds assigned to the Spanish grants and aid programme are aimed at the state need-based grants programme. According to the Ministry of Universities data for the academic year 2018/19, this type of financial aid accounts for 88% of the beneficiaries and almost 93% of the total amount awarded.

Therefore, the measures established are not fully satisfying their

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intended purpose. This is not necessarily due to a lack of resources. Spain's expenditure per student in relation to GDP is somewhat below the OECD average (1.42%) but identical (1.25%) to that of the EU-23 (OECD, 2020). Thus, what we should focus on is the design of the measures implemented.

Extension of the public university *campus* network

The Spanish regional governments have the competence to create a public university or authorise the creation of a private one. As a result of these decisions, which have been more political than academic, the geographical expansion of higher education has developed following a provincial strategy. The regions chose to bring the universities to the students, rather than the students to the universities (Villar, 2020, p.117). Although we are not going to evaluate this here, we can see in figure II that the physical proximity of the public university offer to young people's place of residence has been achieved with this option.

For Hernández and Pérez (2019, p.17), accessibility to university education services for the young population in Spain is guaranteed as the number of public universities ensures the presence of one university for every 24,000 potential students, and one public or private university for every 15,000. Therefore, in their opinion, Spain has a range of university institutions comparable to that of other developed countries. However, this aggregate calculation does not take into account proximity to *campuses*.

In contrast, the AIRef report (2019, p.57) does take proximity into account when it estimates that 62.9% of non-grant holders (57.9% of grant holders) reside within 20km of their family home. This result seems to indicate that proximity is a characteristic of our university system. However, this calculation of the distance between the family home and the university presents a possible bias, as the calculation was made on the basis of an on-line survey of students to which only 0.9% of the target population responded.

This weakness is not present in our indicator which is based on metropolitan areas and the *Population Register*. According to our calculations, an increase in the cost of university studies as a result of living far from a *campus* only affected 27.55% of young people. This

percentage represents the maximum value, depending on whether or not the student decides to move. This decision will be conditioned by the communications network, the cost of transport, the existence of other smaller *campuses* in the province that satisfy the student's interests or the preference for distance learning, such as that offered by the UNED. In other words, living far from the main *campuses* will not always mean a significant increase in the cost of university studies.

Therefore, and according to our results, we can state that Spain has a sufficiently extensive network of public university *campuses* to guarantee accessibility and proximity to higher education services for a significant percentage of the young population.

The public pricing policy and the state grants programme

It is reasonable to think that the benefits of university education in reducing social inequalities, outlined in the introduction, might be the justification for setting public prices well below the cost of the educational service[6]. This implies a subsidy that benefits all students in a linear way, regardless of their economic situation.

In addition to this first equity problem, students benefiting from tuition exemption grants face further equity issues. We have found (figure IV) that there is unjustified discretion in the determination of *threshold 3* according to household size, which can be set at or above the median household income when it is expressed in terms of ECU. As a result, tuition fees are only payable for students whose household income is equal to or above the median income in two- and three-member households, while for the rest of the households the limit is below or well below. In any case, this payment is also subsidised through the public price policy, with no academic or financial requirements for the student.

This result contrasts, moreover, with that of Valdés (2018, p.106-107), for whom the low coverage rate of students on grants out of the total number of university students is not due to the presence of overly

[6] This is only an assumption. The cost of the educational service is not rigorously calculated in Spanish public universities because the implementation of an analytical accounting system has not been completed. However, given that revenues from public prices in undergraduate education represent, on average, 15% of university budgets -estimated from the statistical annex of Hernández and Pérez (2019)-, it can be assumed that these prices are well below the real cost of the service.

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restrictive income thresholds. This idea is inferred from the fact that the average income of four-member households in 2013 was below the income *threshold 3*. In our opinion, that comparison has certain drawbacks that we have tried to avoid. First, like EUROSTAT and the OECD, we compare median income and not means. Second, we do not take a given household size as a reference (Valdés analyses a household of four members which only accounts for 17.2% of Spanish households in 2021, according to the INE), but the results are provided for different household sizes in terms of ECU, the standard indicator of the aforementioned organizations.

In our case, the income *threshold 3* per ECU is below, not above, the median for four-member households; at almost the same level, not above, for two- and three-member households; and finally, it is well below in the case of one-member households, which means that the generosity to which Valdés (2018) refers is not present.

From the point of view of geographical equity, many regions took advantage of the Royal Decree-Law 14/2012 to significantly raise tuition fees. This rise was not justified by an increase in the cost of providing the service nor by an improvement in its quality, but only responded to the regional governments' objective of reducing public expenditure by cutting public funding to universities and shifting a greater percentage of the costs of education onto students. Recently, Organic Law 6/2001 has been amended again[7], returning it to its original wording, with the aim of reducing inter-regional differences. But, for the time being, as shown in figure III, the differences are still substantial.

While Pérez-Esparrells and Jódar (2017) quantify intra- and inter-regional differences, our research adds the analysis of the relationship between the average fee per enrolment credit and the income of the households that actually have to pay the tuition fees to this spatial perspective; that is, we focus on households with incomes per ECU above *threshold 3*. In that analysis, we have found that fee differences between regions are not justified by differences in income levels. As shown in figure III, the increase in the average fee is associated, in general, with a higher relative financial effort for households. In this sense, Catalonia leads the ranking of regions in terms of the level of effort, which represents 5.8% of their median income, followed by Madrid with 5.7%. Meanwhile, at the opposite end of the ranking, the lowest ratio of tuition fees to median

[7] Sixth final disposition of Royal Decree-Law 17/2020, of 5 May.

income is experienced by Galician families with a percentage of 3.4%. However, with respect to Catalonia, it should be noted that since the academic year 2012/13, it has mitigated this effort through the so-called *equity grants*, which involve applying differentiated prices according to household income level.

In this way, the system of public prices not only fails to favour interpersonal equity, but it also damages equity on an inter-territorial level. Therefore, the system requires a coordinated reflection between regions to try to ensure that neither type of inequity occurs. A system of public prices that varies according to the student's household income, such as the Catalan *equity grants*, is a possibility that has only timidly and occasionally been raised at the national level [e.g. in Consejo de Universidades and CGPU (2010, p.42) and in Hernández and Pérez (2019, p.32)]. As explained in Gil and Carta (2017), designing such a system is perfectly possible while at the same time respecting the autonomy of each region. In addition, the experience of the universities' grant management units, which can have direct access to data on applicants' household income and wealth tax returns, at present makes their implementation feasible.

Regarding the rest of the grants, when we work in terms of ECU, we can compare the position of the official poverty line in relation to income *threshold 1 and 2*, which are the levels at which the grants programme is most powerful. This is the novelty of figures V and VI, compared to other works. We found that, although *threshold 1* does not depend on the household size, it is 13% below the line at which a household is considered to be at risk of poverty (figure V). This means that the fixed amount of €1,700 per academic year in 2020/21 does not even reach all the worst-off households.

Again, *threshold 2*, like *threshold 3*, depends on the household size in terms of ECU. It is below or well below the median (one- and four-member households), leading to the conclusion that its level is not particularly generous. In addition, entitlement to a variable amount because household income does not exceed *threshold 2* will also depend on the student's academic performance, available budget and the competitive concurrence of beneficiaries. Perhaps, demanding academic excellence in family contexts where the conditions for study are not very or not at all favourable, makes this requirement an added difficulty compared to the rest of the students.

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Among the regions that establish complementary grants for those students who more vulnerable (household income below AGE *threshold 1*), the Valencian Community's *salary grants* stand out for the amount awarded. In figure VI, we saw that, if the AGE grants do not protect all households at risk of poverty, the *salary grants* of the Valencian Community can only be received by students from households with even lower incomes. In fact, the regional threshold is 49% below the national poverty line for one-member households and 25% below for households with four members. Therefore, in the case of the generous Valencian Community's *salary grants*, could also be significant pools of households in poverty that would not be able to access them.

Finally, the insufficient amounts awarded to the beneficiaries of the grants should be highlighted. In fact, the average annual support amount of €2,550.4 (*threshold 1)* and €1,050.4 (*threshold 2),* such as those actually awarded in the academic year 2017/2018 (Hernández and Pérez, 2019), cannot cover all the costs involved in the decision to continue studying for a degree. These support amounts represent 29.7% (*threshold 1*) and 12.2% (*threshold 2*) of the monthly inter-professional minimum salary set for 2018. It is not surprising that with this insufficient funding, grant recipients are forced to spend part of their time doing paid work to supplement their resources. Thus, it is no longer possible to speak of equality of conditions and opportunities[8].

It is true that the range of grants and financial aimed at preventing students from dropping out of university does not end here, as both regions and universities can also provide some additional support to the students on an ad hoc basis. However, the complexity of the current support system, which can involve up to three different administrations, probably discourage applications. This is also caused by the uncertainty regarding the final amount received and the timing of its resolution. The deadlines are often too long, as the decision depends on the decision of the higher administrations, as they are incompatible with each other. This can mean that, in the end, the universities' own grants can end up being awarded nearly one year later at the beginning of the following academic year, thus failing to cover the student's needs.

[8] Hernández (2019) shares this opinion, when he estimates that the impact on family income derived from one of their members continuing with university studies is more than €18,000 for the academic year 2018/2019. The direct cost represents 8.7% of the total, indirect costs (transport, accommodation and meals) 42.5% and the opportunity cost 48.8%.

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Final reflections

Given these results, a joint review of the current tuition fees policy and grants programme is advisable in order to reduce the relative weight of the subsidy to households that do not need them and to increase the weight of the grants aimed at the most vulnerable households (by increasing amounts of support and reducing the financial requirements). Such a review is all the more appropriate as the recent crisis has brought about major changes in income distribution, resulting in increased inequality. The fee review should also be carried out in order to reduce the unjustifiable dispersion between regions.

In this context, the revision of income thresholds is essential and should, at least, ensure that all households with incomes below the poverty line are covered. Moreover, from the poverty line up to the median national income, the amount of the grant should be modulated inversely to household income.

When the analytical accounting of universities enables us to know the cost of the educational service, it would also be advisable to adjust tuition fees so that they are more realistic, as well as to allow fee-differentiation related to students' economic background for fee-paying undergraduates.

With regard to future research, it would be appropriate to assess the efficiency of extending the network of public university *campuses* throughout the country, as opposed to the alternative of promoting a powerful grants programme to finance the costs of living far from home. This is the particularly the case in those provinces where the number of inhabitants makes it difficult to justify the cost of a new *campus* or university.

We would also like to stress that it is important to mitigate the problems of uncertainty and inefficiencies in the grants programme. In this respect, the AIRef (2019) proposals to create an IT tool as the single point of access to the state university grants programme. This tool could help to simplify the processing of applications and to coordinate the notification of eligibility in the income tax return with the Tax Agency. The proposal to establish a system for the automatic renewal of grants is also very interesting.

To end, our results have some limitations that have been pointed out previously. First, the SILC aggregates all types of grants and scholarships -whether or not linked to income- in a single variable, which could distort

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the relationship between beneficiaries and household income. Second, it would be very interesting to be able to overcome the fragmentation of information on grants from all regions and to analyse their impact.

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Annex

Fee per credit in first, second, third, fourth and successive enrolments in undergraduate degrees by practical level (experimentalidad). Academic year 2020/21

Autonomous region	Andalusia	Aragon	Asturias (Principality of)	Balearic (Islands)	Canary Islands	Cantabria	Castilla-La Mancha	Castilla y León	Catalonia	Valencian Community	Extremadura	Galicia	Madrid (Community of)	Murcia (Region of)	Navarre (Comunidad Foral de)	Basque Country	Rioja (La)	UNED
Practical level 1																		
1st registration	12.62	21.30	15.70	20.82	14.59	15.90	18.87	22.93	27.67	20.00	18.51	13.93	26.14	16.78	22.50	19.84	22.68	21.60 - 20.48
2nd registration	25.25	35.00	34.93	46.26	26.26	32.13	37.73	45.38	34.17	40.07	37.02	19.30	48.03	33.56	46.10	28.60	47.00	30.60
3rd registration	54.71	81.13	64.04	100.16	49.49	69.63	81.76	98.32	74.05	85.01	80.21	31.21	98.75	72.71	99.85	44.01	101.85	67.32
4th and subsequent registrations	75.75	112.34	89.54	138.79	64.24	96.41	113.20	136.14	102.52	113.34		39.79	136.44	100.68	138.25	60.86	141.02	92.82
Practical level 2																		
1st registration	12.62	21.10	12.30	18.50	12.63	14.86	17.64	21.01 - 19.37	25.04	19.27	16.83	9.85	24.55	14.38	15.86	19.19	20.47	15.95 - 14.80 - 13.20
2nd registration	25.25	33.00	27.37	41.12	22.73	30.03	35.28	41.59 - 38,33	30.93	38.39	33.66	13.62	45.25	28.77	32.50	27.63	42.43	22.95 - 20.89
3rd registration	54.71	73.86	50.19	89.02	42.84	65.06	76.45	90.10 - 83.04	67.00	81.47	72.93	22.04	92.86	62.32	70.50	42.53	91.93	50.49 - 47.09
4th and subsequent registrations	75.75	102.24	70.15	123.35	55.60	90.09	105.85	124.76 - 114.99	92.78	108.62		28.06	128.57	86.30	97.65	58.87	127.28	69.62 - 64.84
Practical level 3																		
1st registration	12.62	16.00	8.63	16.21	10.16	12.49	14.58	18.32 - 15.22	17.69	16.41	15.70		21.39			14.39	14.08	
2nd registration	25.25	24.00	21.32	36.02	18.29	25.24	29.16	36.25 - 30.11	21.85	31.07	31.38		40.02			21.03	29.18	
3rd registration	54.71	52.79	35.21	77.97	34.48	54.69	63.18	78.55 - 65.24	47.34	65.92	68.00		82.30			32.37	63.22	
4th and subsequent registrations	75.75	73.07	49.24	108.05	44.74	75.72	87.47	108.76 - 90.33	65.55	87.89	-		113.71			44.14	87.54	
Practical level 4																		
1st registration	12.62	13.50		13.53	9.47	11.02	12.13	14.05		14.96	12.33					14.08		13.39 - 13.00
2nd registration	25.25	20.00		30.05	17.05	22.27	24.26	27.81		28.35	24.67					20.48		18.97
3rd registration	50.84	44.28		65.06	32.12	48.25	52.56	60.25		60.12	53.44					31.51		41.74
4th and subsequent registrations	67.79	61.31		90.15	41.69	66.80	72.78	83.42		80.16						43.19		57.55
Practical level 5																		
1st registration	12.62			11.59		10.17		12.94		13.86	10.31							
2nd registration	25.25			25.77		20.55		25.61		26.26	20.62							
3rd registration	48.13			55.79		44.53		55.49		55.71	44.67							
4th and subsequent registrations	64.17			77.30		61.65		76.83		74.27								
Average fee	12.62	17.79	12.67	16.05	12.08	12.95	15.94	16.59	22.69	17.04	14.78	11.78	23.17	15.49	18.85	16.93	15.74	14.70

Source: Ministry of Universities.

Noncognitive factors related to academic performance

Factores no cognitivos relacionados con el rendimiento académico

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Abstract

There are few holistic models looking at the interrelations between noncognitive variables and their effects on academic outcomes. The objectives of this study were to examine a holistic model that seeks to predict academic performance based on the relationships between noncognitive variables and academic performance, and to examine its stability in different educational grades.

Data from two samples of Mexican students (19,826 students seeking admission to high school; 85,040 seeking admission to college) were analyzed to examine relationships between academic behaviors, perseverance, assertiveness, cooperation, internal locus of control, external locus of control and test scores and high school and college admission test scores. A series of structural equation models were conducted to examine scale dimensionality, relationships between variables, and measurement invariance.

The models showed good fit to the data and the effects were stable across the two samples. Cooperation and perseverance had direct effects on academic behaviors and indirect effects on test scores. Internal locus of control was a

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strong predictor of cooperation, perseverance, and assertiveness, and showed a positive indirect effect on test scores, but a negative effect on academic behaviors. External locus of control and assertiveness were weak predictors of test scores.

The importance of examining the effects of noncognitive variables in a holistic framework is highlighted, as it allows identifying variables with weak effects as well as unexpected results.

Key words: noncognitive variables, academic performance, cooperation, perseverance, assertiveness, academic behaviors.

Resumen

Existen pocos modelos holísticos sobre relaciones entre variables no cognitivas y sus efectos en los resultados académicos. Los objetivos del estudio fueron examinar un modelo holístico que busca predecir el rendimiento académico basado en las interrelaciones entre variables no cognitivas, y examinar su estabilidad en diferentes grados educativos.

Se analizaron datos de dos muestras de estudiantes mexicanos (19,826 estudiantes buscando el ingreso a la educación media superior; 85,040 buscando el ingreso a la universidad), para examinar relaciones entre conductas académicas, perseverancia, asertividad, cooperación, locus de control interno, locus de control externo y los resultados a exámenes de admisión a la educación media superior y superior. Se realizaron una serie de modelos de ecuaciones estructurales para examinar la dimensionalidad de las escalas, las relaciones entre variables, y la invarianza de medición entre las muestras.

Los modelos tuvieron un buen ajuste a los datos y los efectos fueron estables a través de las dos muestras. La cooperación y la perseverancia tuvieron efectos directos en las conductas académicas y efectos indirectos en los puntajes de los exámenes. El locus de control interno fue un fuerte predictor de la cooperación, perseverancia y asertividad, y mostró un efecto indirecto positivo en los puntajes de las pruebas, pero un efecto negativo en los comportamientos académicos. El locus de control externo y la asertividad fueron predictores débiles de los puntajes en los exámenes.

Se destaca la importancia de examinar los efectos de las variables no cognitivas en un marco holístico que permita identificar variables con efectos débiles así cómo resultados inesperados.

Palabras clave: variables no cognitivas, rendimiento académico, cooperación, perseverancia, asertividad, conductas académicas.

Introduction

Noncognitive skills entail an extensive array of characteristics such as personality, motivation, attitudes, curiosity, and study skills (Heckman & Kautz, 2012; Kyllonen, et al., 2014). The growing interest in the study of noncognitive variables is related to an increase in empirical evidence regarding their ability to predict academic outcomes (Duckworth & Yeager, 2015; Gamazo & Martínez-Abad, 2020; Heckman, et al., 2014; Pitsia, et al., 2017; Resino et al., 2019), and their malleability through interventions (Durlak, et al., 2011; Kautz, et al., 2014).

Various meta-analyses have examined the association of noncognitive skills with academic outcomes (Richardson, et al., 2012; Robbins, et al., 2004), but studies have rarely focused on the interactions between more than two variables or on the mechanisms through which they influence each other and influence academic outcomes. In order to have a holistic understanding of the mechanisms through which noncognitive variables influence academic performance, it is necessary to propose and evaluate models concerning the relationships between these variables. Although several models have been proposed to explain academic performance (e.g., Bean, 1980; Ryan & Deci, 2019; Tinto, 1993), they have not focused on the interrelations between noncognitive variables. An important exception is the theoretical model of Farrington, et al. (2012), which states hypotheses about the mechanisms through which noncognitive variables may influence academic performance.

Few studies have provided empirical support to the model proposed by Farrington and collaborators (for an exception see Farruggia et al., 2016). The main objective of this study was to evaluate the model in a sample of Mexican students who took the high school (EXANI-I) and college (EXANI-II) Admission Tests elaborated by the Centro Nacional de Evaluación para la Educación Superior (Ceneval). A secondary objective was to examine the stability of the model between the two samples.

Conceptual Framework

In this study, we focus on the model of Farrington et al., (2012) that classifies noncognitive skills in five categories and states hypotheses of the relationships between them and with academic performance. Next,

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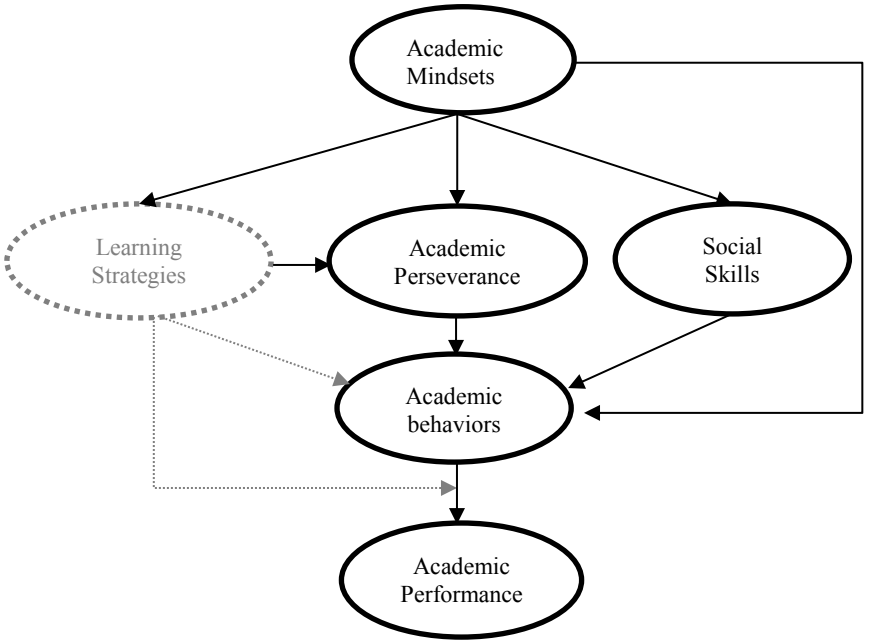
we describe the five categories of noncognitive variables proposed by Farrington et al., (2012) and the relationships expected between them[1] (Figure 1).

FIGURE 1. Section of the holistic model proposed by Farrington et al. (2012)



Note: Learning strategies and their effects are shown in grey since they were not assessed in this study due to the lack of items aligned with this construct.

[1] See original publication of Farrington et al., (2012) for further details on the literature and procedure to design the model.

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Academic Behaviors

They are defined as the activities related to school work, such as attending classes, doing homework, etc. The model holds that this is the only category that has a direct effect on academic performance (Allensworth & Easton, 2007; Cooper, et al., 2006).

Academic Perseverance

It has a direct effect on academic behaviors and includes constructs such as grit, tenacity, delayed gratification, self-discipline, and self-control. Perseverance is what distinguishes those students who demonstrate academic behaviors necessary to pass a class and engage in those behaviors over long periods of time (Duckworth, et al., 2007).

Academic Mindsets

It is a set of attitudes or beliefs about oneself with regards to academic work. It includes variables such as sense of belonging, the belief that ability can increase through effort, the belief about having self-control over the likelihood of being successful in an assignment, and the perception about the usefulness and value of an assignment (Bandura, 1986; Dweck & Leggett, 1988; Eccles et al., 1983; Ryan & Deci, 2000). The model suggests that academic mindsets have direct relationships with academic behaviors, perseverance, learning strategies, and social skills.

Learning Strategies

They are the processes and tactics that are used to remember events, and the action plans and thoughts used for monitoring learning. They include study skills, metacognition, and self-regulated learning (Flavell, 1979; Pintrich & De Groot, 1990; Zimmerman & Schunk, 1989). In the model, there is a direct relationship of learning strategies with perseverance

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and academic behaviors, as well as an interaction between academic behaviors and learning strategies.

Social Skills

They are defined as the behaviors that improve social interactions among peers or among students and teachers. They include constructs such as cooperation, assertiveness, and empathy. There are studies that indicate positive direct relationships between social skills and academic outcomes (Malecki & Elliot, 2002), and indirect relationships through academic behaviors (Wentzel, 1991).

Purpose of the Study

Despite the importance of the model proposed by Farrington, et al. (2012), which lies in proposing hypotheses regarding the interrelations among noncognitive variables, only one article examining such relationships was found. Farruggia et al., (2016) examined a modified version of the model that included perseverance, academic mindset, and learning strategies as predictors of academic performance and retention. The study by Farrugia et al., conducted with 1,603 college students, found a strong effect of academic mindsets and a moderate effect of perseverance on academic performance. Academic performance was the only predictor with a strong effect on retention. A limitation of the study is that the effect of academic behaviors was not studied and, according to the model of Farrington et al., (2012), it is the only category that has a direct effect on academic performance. The main purpose of the present study was to examine a section of the model proposed by Farrington et al. (2012); this model does not include learning strategies due to the lack of items conceptually aligned with this construct.

The model by Farrington et al., assumes that the relationships between noncognitive variables and academic outcomes are stable across various education levels. However, there is ample evidence showing that noncognitive skills are developed at different stages in life (Kautz et al., 2014; Wigfield, et al., 2006), and previous studies indicate that the relationship between these variables and academic outcomes change over

time (Gore, 2006; Poropat, 2009). It is expected that the relationships put forward in the model change at different school grade levels. Hence, the second purpose of this research was to examine stability of the scales and the model proposed in two samples of distinct education grades.

Method

Sample

Data were obtained from two large-scale assessments used in Mexico in 2015 for admission to high school, EXANI-I, and college, EXANI-II, developed by Ceneval. The total sample size in EXANI-I was 19,826, with an average age of 16.28 years, 47% men from 284 institutions, 78.5% of which were public middle schools. The sample of EXANI-II comprised 85,040 people, with an average age of 19.26, 50.4% of whom were men from 1,214 institutions, of which 70.6% were public schools.

Instruments

The noncognitive items were administered in a pilot study in 2013 and 2014 as part of the background questionnaires, also developed by Ceneval, that test-takers need to fill in when registering for EXANI-I and EXANI-II. Statistical analyses were conducted to identify and correct problematic items. The corrected scales were administered in 2015.

Academic behaviors

In this study they were defined as activities related to school work that demonstrate students' engagement with school (Hart, et al., 2011), and were measured with four items about the frequency with which examinees studied for exams, handed in homework on time, participated in class, and were prepared for class. The items (for example, "I spend time studying outside of school") were responded with a Likert scale

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with four response options (never o almost never; sometimes, frequently, always or almost always).

Perseverance of effort

This scale was adapted from the study by Duckworth & Quinn (2009), who defined perseverance as the persistence and passion to accomplish long-term goals. The Likert scale consisted of four items with statements like "I finish whatever I begin," with four response options (not at all like me, somewhat like me, like me, just like me).

Academic mindsets

This construct was measured with two scales: internal locus of control with three items, and external locus of control with four items. Internal locus of control was defined as the beliefs that examinees have concerning the control of their lives through self-motivation or self-determination, while external locus of control assessed the degree to which people attribute the events in their lives to luck, fate, other people or external factors (Ryan & Connell, 1989; Visdómine-Lozano & Luciano, 2006). Students showed their agreement with statements such as "The fact that I do well or badly at school totally depends on me" for internal locus of control and "My grades at school are due to how lucky I am" for external locus of control. The same response options of the perseverance scale were used.

Social skills

Social skills were measured with two scales: assertiveness with three items and cooperation with five items. Assertiveness was defined as the direct expression of feelings and was measured using some items of the study by Peneva & Mavrodiev (2013) (for example, "I communicate my opinions even when they are different from the group's"). Cooperation was defined as effective relationships to achieve group objectives by means of an exchange of knowledge and skills (Harris & Harris, 1996).

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The cooperation scale was based on the items included in the study by Pfaff & Huddleston (2003) (for example, "I make suggestions to improve the performance of the team"). The same response options for the academic behaviors were employed.

Academic performance

We used the students' scores in EXANI-I, with 92 items, and EXANI-II, with 112 items, as dependent variables. These aptitude tests examine generic competences in the areas of mathematical thinking, analytical thinking, language structure, and reading comprehension. In this study, we solely used the general score.

Procedure

Design

The study applies a secondary analysis of two large-scale assessments, thus implementing a non-experimental cross-sectional cohort design.

Statistical analysis

All analyses were conducted in M*plus* version 7.2 (Muthén & Muthén, 1998-2012) using WLSMV as the estimator given the categorical nature of the items. We cross-validated the results to avoid drawing conclusions highlighting the characteristics of the sample used. Each sample was divided randomly in a test sample and a validation sample of approximately the same size. The test sample of EXANI-I (subsequently called EXANI-I-T) and the validation sample (EXANI-I-V) each comprised 9,913 examinees. The test sample of EXANI-II (EXANI-II-T) comprised 42,625 examinees, while the validation sample (EXANI-II-V) comprised 42,415 examinees. The statistical models were first examined in the test samples and the final model was examined in the validation samples to evaluate the replicability of results.

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As a preliminary step, scale dimensionality was examined to provide evidence of construct validity. Through a confirmatory factor analysis (CFA) for categorical data, a model of six correlated factors was examined: academic behaviors, perseverance of effort, internal locus of control, external locus of control, assertiveness, and cooperation. Items with standardized factor loadings higher than 0.4 were selected. The overall model fit was assessed through a chi-squared test of model fit. As this test is sensitive to large sample sizes, more emphasis was given to fit indices such as the comparative fit index (CFI) and the root mean square error of approximation (RMSEA). CFI values higher than 0.90 and RMSEA values lower than 0.08 were indicative of adequate fit, while CFI values higher than 0.95 and RMSEA values lower than 0.05 were indicative of good model fit (West, et al., 2012).

Measurement invariance

Measurement invariance was conducted to examine the extent to which the items had equivalent psychometric properties between the two samples. A series of multi-group CFA models were compared, where each model had an increasing number of constraints (Vandenberg & Lance, 2000). First, configural invariance was assessed by allowing all item parameters to be freely estimated in each group. Next, metric invariance was examined by constraining the factor loadings to equality between the two samples. In a third model, strong measurement invariance was examined by constraining the thresholds or intercepts to equality. Finally, strict measurement invariance was assessed by adding equality constraints in the unique variances. These nested models were compared through the chi-square difference test, but due to its sensitivity to large sample sizes, the change in CFI was also considered, where changes of 0.01 or lower were considered evidence in favor of models with more constraints (Cheung & Rensvold, 2002). When one of the models showed lack of fit, partial invariance models were examined by allowing some parameters to be freely estimated. Modification indices (MI) were examined to determine which item parameters needed to be freely estimated across groups.

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Relationships between latent variables

Structural equation modeling was used to examine the hypotheses stated in the model by Farrington et al., (2012). Using the CFA results as the basis for the structural equation models, we added paths between the latent variables according to Figure 1.

To examine the stability of the model across samples, we compared the fit of two models. In the unconstrained model, the regression (i.e., path) coefficients were freely estimated in each sample, while in the constrained model, all regression coefficients were constrained to equality between the two samples. The two models were compared using the chi-square test difference for categorical data, where a significant chi-square difference was interpreted as evidence that at least one of the coefficients was different between the samples. Considering the sensitivity of the chi-square to large sample sizes, the RMSEA and the CFI were also examined.

Once the stability of the model was tested, the mediation effects indicated in the model of Farrington et al., (2012; Table 1) were examined in the final model. Mediated effects were calculated as the product of the regression coefficients (MacKinnon, et al., 2002) and assessed using 95% confidence intervals obtained from 200 bootstrap samples (MacKinnon, et al., 2004).

TABLE 1. Indirect effects examined in the model

Indirect Effect	Independent variable	Mediator	Dependent variable
1	Perseverance	Academic behaviors	Test scores
2	Assertiveness	Academic behaviors	Test scores
3	Cooperation	Academic behaviors	Test scores
4	Internal locus of control	Academic behaviors	Test scores
5	External locus of control	Academic behaviors	Test scores
6	Internal locus of control	Perseverance- Academic behaviors	Test scores
7	Internal locus of control	Assertiveness- Academic behaviors	Test scores
8	Internal locus of control	Cooperation - Academic behaviors	Test scores
9	External locus of control	Perseverance- Academic behaviors	Test scores
10	External locus of control	Assertiveness- Academic behaviors	Test scores
11	External locus of control	Cooperation - Academic behaviors	Test scores

Results

Construct validity

The 6-factor model showed adequate fit to the data in both samples (RMSEA < 0.08 and CFI > 0.90); an item in the perseverance of effort scale showed standardized loadings of 0.226 and 0.227 in the EXANI-I-T and EXANI-II-T samples, respectively. This item was deleted in both samples and the CFA models were reexamined. The new model showed an adequate fit to the data according to the RMSEA and CFI, and all the factor loadings had values above 0.5 (Table 2).

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TABLE 2. Results for the final model of six correlated factors in each sample

	EXANI-I-T		EXANI-II-T	
Items	**Standardized factor loadings**	**Non-standardized factor loadings**	**Standardized factor loadings**	**Non-standardized factor loadings**
Academic behaviors				
I bring to class all the materials I need	0.92	1.00	0.69	1.00
I participate in class	0.77	0.84	0.69	1.00
I spend time studying outside of school	0.82	0.90	0.66	0.96
I hand in homework on time	0.98	1.07	0.77	1.11
Reliability (omega)	0.80		0.67	
Perseverance				
I finish whatever I begin	0.80	1.00	0.75	1.00
I am a person that strives	0.84	1.06	0.81	1.07
I am a hard worker	0.87	1.08	0.82	1.09
Reliability (omega)	0.79		0.75	
Cooperation				
I participate in the planning of activities	0.86	1.00	0.83	1.00
I collaborate in the development of strategies to accomplish work goals	0.90	1.04	0.85	1.03
I intervene to try to solve disagreements among team members	0.76	0.88	0.71	0.86
I make suggestions to improve the performance of the team	0.85	0.99	0.80	0.97

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I do the tasks that I have to do	0.82	0.95	0.84	1.01
Reliability (omega)	0.76		0.73	
Assertiveness				
I defend my rights	0.82	1.00	0.78	1.00
I communicate my opinions although they are different from the group's	0.86	1.05	0.82	1.04
I defend myself when someone accused me of something I didn't do	0.76	0.93	0.71	0.91
Reliability (omega)	0.75		0.71	
Internal locus of control				
If I try enough, I'll be successful at school	0.90	1.00	0.85	1.00
The fact that I do well or badly at school totally depends on me	0.72	0.81	0.64	0.75
If I set my mind to it, I do better at school	0.76	0.85	0.71	0.84
Reliability (omega)	0.69		0.62	
External locus of control				
My grades at school are due to how lucky I am	0.89	1.00	0.87	1.00
If my family supported me more, I'd do better at school	0.54	0.60	0.53	0.61
My grades at school are due to things I can't change	0.77	0.86	0.75	0.87
If I had other teachers, I'd do better at school	0.50	0.55	0.47	0.55

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Reliability (omega)	0.54	0.53
Model fit	$\chi^2(194)= 6079.35$, $p<.001$ RMSEA=.055, CFI=.970	$\chi^2(194)= 22800.30$, $p<.001$ RMSEA=.053, CFI=.952

Note: EXANI-I-T test sample of high school applicants; EXANI-II-T test sample of college applicants.

The correlations between academic behaviors, perseverance of effort, assertiveness, cooperation, and internal locus of control were positive and high, with correlation values between 0.50 and 0.83 (Table 3), while the correlations between external locus of control and the rest of latent variables were negative. In general, these correlations and the fit of the CFA models provide evidence that the scales measure related but independent constructs.

TABLE 3. Correlations between latent variables in the EXANI-I test sample (lower triangular matrix) and in the EXANI-II test sample (upper triangular matrix)

	Academic behaviors	Perseverance	Cooperation	Assertiveness	Internal locus of control	External locus of control
Academic behaviors	1	.50	.54	.38	.45	-.26
Perseverance	.72	1	.62	.56	.71	-.22
Cooperation	.83	.59	1	.62	.61	-.30
Assertiveness	.56	.59	.55	1	.56	-.22
Internal locus of control	.63	.75	.58	.59	1	-.23
External locus of control	-.24	-.15	-.21	-.20	-.14	1

Note: All values were significant $p < .001$.

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Measurement invariance

The difference in the chi-square test of model fit in the configural, metric and strong invariance models was significant in most comparisons due to the large sample sizes. Nonetheless, the change in CFI was smaller than 0.01 in each comparison, suggesting that the scales were invariant. Given the contradictory information between the chi-square test of model fit and the change in the CFI, we examined the MIs to identify possible noninvariant items. In each scale, the number of parameters freely estimated was minimized to avoid overemphasizing nuisances of the assessed samples.

The invariance analyses for assertiveness and external locus of control did not reveal noninvariant parameters according to the change in CFI and MIs. In these scales, strict measurement invariance was found (Table 4).

TABLE 4. Fit for invariance models

Model	χ^2 (df)	RMSEA	CFI	$\Delta\chi^2$ (Δdf)	$\Delta\chi^2$ p	ΔCFI
Academic behaviors						
Configural 1	3585.99 (5)	0.166	0.976			
Configural 2	195.98 (3)	0.050	0.999			
Metric	367.38 (6)	0.048	0.998	194.52 (3)	0	0.001
Strong	1250.24 (13)	0.061	0.992	878.33 (7)	0	0.006
Partial strong	542.52 (12)	0.041	0.996	216.99 (6)	0	0.002
Strict strong	1048.325 (14)	0.053	0.993	492.17 (2)	0	0.003
Perseverance						
Configural	66.74 (1)	0.050	0.999			
Metric	79.94 (3)	0.031	0.999	11.54 (2)	0.003	0.003
Strong	464.42 (8)	0.047	0.996	392.43 (5)	0	0.001
Partial strong	232.33 (7)	0.035	0.998	158.50 (4)	0	0.001
Partial strict	322.58 (8)	0.039	0.997	99.82 (1)	0	0
Cooperation						
Configural 1	4485.82 (11)	0.125	0.980			
Configural 2	418.77 (9)	0.039	0.998			
Metric	324.52 (13)	0.042	0.999	3.94 (4)	0.41	-0.001

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Strong	1074.35 (21)	0.029	0.995	718.81 (8)	0	0.004
Partial strong	527.93 (20)	0.038	0.998	220.04 (7)	0	0.001
Partial strict	995.489 (23)	0.036	0.996	467.43 (3)	0	0.002
Assertiveness						
Configural	4.56 (1)	0.012	1			
Metric	6.63 (3)	0.007	1	1.55 (2)	.46	0
Strong	95.36 (8)	0.021	0.999	90.51 (5)	0	0.001
Strict	243.45 (10)	0.030	0.997	150.34 (2)	0	0.002
Internal locus of control						
Configural	24.48 (1)	0.030	1			
Metric	35.68 (3)	0.021	0.999	12.72 (2)	0	0.001
Strong	94.87 (8)	0.017	0.998	62.60 (5)	0	0.001
Strict	315.94 (10)	0.034	0.994	196.53 (2)	0	0.004
Partial strict	184.18 (9)	0.027	0.997	78.57 (1)	0	0.001
External locus of control						
Configural	905.19 (5)	0.083	0.979			
Metric	813.55 (8)	0.062	0.981	2.74 (3)	0.43	-0.002
Strong	818.54 (15)	0.046	0.981	86.02 (7)	0	0
Strict	825.95 (18)	0.042	0.981	67.66 (3)	0	0

In the case of perseverance of effort, although the change in CFI from the metric to the strong invariance model was below 0.01, the MI for the threshold of the item "I am a hard worker" suggested the presence of noninvariance. The threshold for this item was freely estimated and the final model consisted of partial strict factorial invariance.

In the case of internal locus of control, the MIs showed a noninvariant unique variance in the item "The fact that I do well or badly at school totally depends on me." Therefore, that parameter was freely estimated in each group and the final model consisted of partial strict factorial invariance.

The configural model for academic behaviors showed poor model fit according to RMSEA = 0.166. The MIs showed that a correlation between the items "I participate in class" and "I spend time studying outside of school" was necessary in the EXANI-II sample. We decided to include the correlation since, in most cases, in order to participate in class students must prepare outside of school time. Likewise, the configural model for

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cooperation showed poor model fit according to the RMSEA value of 0.125. The MIs showed that a correlation between the items "I make suggestions to improve the performance of the team" and "I intervene to try to solve disagreements among team members" was necessary. We decided to include the correlation as in both cases cooperation involves interposing in the team's dynamics to make positive changes. After including the correlations in academic behaviors and cooperation in both samples, the configural models showed good fit to the data. In both scales, the MIs in the strong measurement invariance model indicated the presence of a noninvariant threshold in one of the items, which was freely estimated in each sample. The final models for academic behaviors and cooperation consisted of partial strict measurement invariance.

Relationships between latent variables

The unconstrained model showed a significant chi-square test of model fit χ^2 (501) = 36,098.36, p <.001, but adequate fit according to the RMSEA = 0.052 and CFI = 0.947. The model with equality constraints in the path coefficients showed a significant chi-square χ^2 (513) = 31,863, p <.001, but good fit according to RMSEA = 0.048 and CFI = 0.953. Due to the large sample sizes examined, the comparison between the two models revealed a significant value in the chi-square difference test $\Delta\chi^2$ (12) = 546.09, p <.001, but the change in CFI showed that the constrained model had better fit to data. Therefore, the constrained model was selected as the final model. This model was examined in the validation samples and showed a similar model fit than the test sample, χ^2 (513) = 29,643.38, p <.001, RMSEA = 0.047, and CFI = .957.

The final regression coefficients of the model in Figure 1 are shown in Table 5. Due to the equality constraints, the unstandardized regression coefficients are identical in the samples of EXANI-I and EXANI-II, so only one value is shown. The comparison of unstandardized coefficients in the test and validation samples indicates similar regression coefficients, providing evidence in favor of the generalization of results.

The standardized results indicate that cooperation was the strongest predictor of academic behaviors, followed by perseverance of effort

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(Table 5)[2]. External locus of control was a negative predictor of academic behaviors, perseverance of effort, cooperation, and assertiveness. Internal locus of control was a negative predictor of academic behaviors, but as significant positive predictor of the rest of the noncognitive variables.

TABLE 5. Regression coefficients of the final model

Effect	Non-standardized values		Standardized values			
	Test	Validation	EXANI-I-T	EXANI-II-T	EXANI-I-V	EXANI-II-V
DV: Test scores IV:						
Academic behaviors	4.04 (0.08)	4.24 (0.09)	0.45 (0.01)	0.25 (0.00)	0.44 (0.01)	0.25 (0.00)
DV: Academic behaviors IV:						
Perseverance	0.32 (0.01)	0.31 (0.01)	0.28 (0.01)	0.42 (0.02)	0.27 (0.01)	0.40 (0.02)
Internal locus of control	-0.17 (0.02)	-0.14 (0.02)	-0.13 (0.02)	-0.20 (0.03)	-0.11 (0.02)	-0.17 (0.03)
External locus of control	-0.01 (0.00)	-0.01 (0.00)	-0.04 (0.00)	-0.06 (0.01)	-0.05 (0.00)	-0.08 (0.01)
Cooperation	0.47 (0.01)	0.46 (0.01)	0.42 (0.01)	0.68 (0.01)	0.43 (0.01)	0.66 (0.01)
Assertiveness	0.10 (0.01)	0.08 (0.01)	0.07 (0.01)	0.11 (0.01)	0.06 (0.01)	0.09 (0.01)
DV: Perseverance IV:						

[2] Since latent variances differ between EXANI-I and EXANI-II samples, the standardized values also differ between them. The standardized regression coefficients must not be compared between the samples and must be used only to evaluate the magnitude of the effect of each variable within a sample.

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Internal locus of control	0.90 (0.01)	0.89 (0.01)	0.79 (0.01)	0.81 (0.00)	0.79 (0.01)	0.82 (0.00)
External locus of control	-0.01 (0.00)	-0.03 (0.00)	-0.06 (0.01)	-0.07 (0.01)	-0.06 (0.01)	-0.06 (0.01)
DV: Cooperation IV:						
Internal locus of control	0.83 (0.01)	0.83 (0.01)	0.70 (0.01)	0.68 (0.01)	0.72 (0.01)	0.70 (0.00)
External locus of control	-0.03 (0.00)	-0.03 (0.00)	-0.16 (0.01)	-0.16 (0.01)	-0.13 (0.01)	-0.13 (0.01)
DV: Assertiveness IV:						
Internal locus of control	0.70 (0.01)	0.68 (0.01)	0.70 (0.01)	0.69 (0.00)	0.70 (0.01)	0.70 (0.00)
External locus of control	-0.02 (0.00)	-0.02 (0.00)	-0.12 (0.01)	-0.13 (0.01)	-0.11 (0.01)	-0.11 (0.01)

Note: Standard errors are shown in parentheses. DV: dependent variable; IV: independent variable; EXANI-I-T: high school admission exam-test sample; EXANI-II-T: college admission exam-test sample; EXANI-I-V: high school admission exam-validation sample; EXANI-II-V: college admission exam-validation sample.

Mediation effects

None of the 95% confidence intervals of the mediation effects included zero, indicating that all effects were statistically significant (Table 6). Unstandardized mediation effects in the test and validation samples are very similar to each other, which suggests that the results are stable throughout the samples.

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TABLE 6. Mediation effects

Indirect effect	Unstandardized effect	95% confidence interval	Standardized effect	
			EXANI-I	EXANI-II
Perseverance – Academic behaviors – Test scores	1.28	1.18, 1.38	0.13	0.10
	(1.28)	(1.15, 1.40)	(0.12)	(0.10)
Assertiveness– Academic behaviors – Test scores	0.39	0.32, 0.46	0.03	0.03
	(0.33)	(0.25, 0.40)	(0.03)	(0.02)
Cooperation – Academic behaviors – Test scores	1.89	1.80, 1.99	0.19	0.17
	(1.94)	(1.85, 2.03)	(0.19)	(0.17)
ILC – Academic behaviors – Test scores	-0.69	-0.87, -0.53	-0.06	-0.05
	(-0.58)	(-0.75, -0.41)	(-.05)	(-0.04)
ILC – Perseverance – Academic behaviors – Test scores	1.15	(1.06, 1.24)	0.10	0.08
	(1.13)	(1.02, 1.23)	(0.10)	(0.08)
ILC – Assertiveness – Academic behaviors – Test scores	0.27	0.22, 0.32	0.02	0.02
	(0.22)	(0.17, 0.28)	(0.02)	(0.02)
ILC – Cooperation – Academic behaviors – Test scores	1.58	1.50, 1.66	0.14	0.11
	(1.60)	(1.51, 1.68)	(0.14)	(0.12)
ELC – Academic behaviors – Test scores	-0.03	-0.04, -0.02	-0.02	-0.01
	(-0.05)	(-0.06, -.004)	(-0.02)	(-0.02)
ELC – Perseverance – Academic behaviors – Test scores	-0.01	-0.02, -0.01	-0.01	-0.01
	(-0.02)	(-0.02, -0.01)	(-0.01)	(-0.01)
ELC – Assertiveness– Academic behaviors – Test scores	-0.01	-0.01, -0.005	-0.004	-0.004
	(-0.01)	(-0.01, -0.005)	(-0.003)	(-0.003)
ELC – Cooperation – Academic behaviors – Test scores	-0.05	-0.05, -0.04	-0.03	-0.03
	(-0.05)	(-0.06, -0.05)	(-0.03)	(-0.02)

Note: ILC: internal locus of control; ELC: external locus of control. The validation samples results are shown in parenthesis. Unstandardized path coefficients are the same in test and validation samples, hence, only one value is shown. Considering that the latent variables have different variances, standardized coefficients differ in each sample.

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The standardized effects indicate that the strongest indirect effects were those of academic behaviors as the mediator of the relationship between cooperation and academic performance; academic behaviors as the mediator of the relationship between perseverance of effort and academic performance; and cooperation and academic behaviors as mediators of the relationship between internal locus of control and academic performance.

Internal locus of control had a negative indirect effect on test scores when the relationship was mediated only by academic behaviors. Nevertheless, when the relationship also was mediated by perseverance of effort, assertiveness, or cooperation, internal locus of control showed a positive indirect effect on the test scores.

Discussion

The purposes of this study were to assess a section of the model proposed by Farrington et al., (2012) and examine the stability of the model across two education levels. The structural equation modeling results provide evidence of construct validity, of the stability of scales and the overall model through education levels and provide information regarding the strongest predictors of academic performance.

The results indicate that cooperation and perseverance were the strongest predictors of academic behaviors, with indirect effects on test scores. Various studies have demonstrated that perseverance of effort has a strong association with academic performance (Duckworth, et al., 2007; Eskreis-Winkler, et al., 2014), while the benefits of cooperation have been reported in previous studies (Davidson & Major, 2014; Dingel, et al., 2013; Malecki & Elliot, 2002).

The final model revealed interesting effects of internal locus of control, which was a strong predictor of cooperation, perseverance, and assertiveness, and showed a positive indirect effect on test scores. In contrast with the findings of previous studies (Agnew, et al., 1993), internal locus of control had a negative direct effect on academic behaviors. A possible explanation is that if a greater sense of responsibility is not matched by ability and the appropriate circumstances to achieve academic goals, it can result in higher stress which may be negatively related to academic behaviors. Although this hypothesis must be tested,

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previous studies have shown negative consequences of internal locus of control (Avtgis, 1998; Dweck, 1986; Whitley, 1998).

We found that external locus of control had a negative direct effect on all noncognitive variables, but its highest effects were on cooperation and assertiveness. Consistent with previous studies (Coleman et al., 1966; Grimes, 1997), its indirect effect on test scores, though statistically significant, was close to zero and, therefore, of limited practical importance.

We also found that the relationship between assertiveness and academic behaviors was weaker than the relationships of perseverance, internal locus of control, and cooperation with academic behaviors. A possible explanation is that assertiveness may have a curvilinear relationship with academic outcomes, as has been reported in the context of leadership (Ames, 2009). In addition, most of the studies examining the relationship between assertiveness and academic success have been conducted with preschool students (Montroy, et al., 2014) and further research is needed with high school and college student samples.

Conclusions

This study is one of the first attempts to empirically test the model proposed by Farrington et al., (2012) and as such, it provides an important contribution to the understanding of the interrelations between noncognitive variables and their effects on academic performance. The results underline the importance of examining the effects of noncognitive variables under a more holistic approach. By doing so, we were able to identify unexpected results, for example, the negative relationship between internal locus of control and academic behaviors, and the small statistical effects of external locus of control and assertiveness on test scores. These findings would have been more difficult to observe if the variables were examined in isolation.

Furthermore, this study provides evidence about the stability of the results in two samples of distinct education levels. In addition to theoretical implications, these results also have practical implications as educational institutions could use this information to design interventions with the reassurance that variables related to academic success of students about to enter high-school are the same variables related to academic success

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of students interested in pursuing a college degree.

Nonetheless, as any investigation, this study has limitations that must be considered in future studies. The noncognitive scales were part of the background questionnaires of admission tests, and therefore there were constraints concerning the number of items that could be included in each scale. Although the scales were reviewed by content experts to ensure the items reflected the construct definitions, the limited number of items included made it difficult to fully capture all the aspects of the categories proposed by Farrington et al., (2012). The small number of items also affected scale reliability, which may cause attenuation in the estimated parameters. Future studies must consider the balance between measuring scales with a high number of items while at the same time assessing as many noncognitive variables as possible, allowing for a more holistic understanding of the interactions among them.

Finally, an important limitation is that this is a correlational study where conclusions on causality cannot be made. Although the holistic model proposes causal relationships between the variables, this study cannot support such conclusions. Future longitudinal experimental studies must be conducted to examine if the variables have a causal effect as suggested in the model.

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Classroom practices to promote critical thinking skills in the use of digital media[1]

Prácticas de aula para promover el pensamiento crítico en el uso de los medios digitales

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Abstract

In the twenty-first century, fake news, disinformation and information overload are a growing problem. The internet and social media contribute to their growth. To address this situation, the educational interventions of primary school teachers should make students aware of the issue and help them develop critical thinking skills, thus making them less vulnerable to digital media. Digital media education cannot be reduced to the use of technology. This study follows a quantitative design to analyse primary school teachers'

1 The work has been carried out within the framework of the research project «Truth and ethics in social networks. Perceptions and educational influences in young users of Twitter, Instagram and YouTube (Internética)» financed by the call of projects I+D+i of the Ministry of Science, Innovation and Universities of 2019 (PID2019-104689RB-I00). FPU20/00931.

perceptions of the classroom practices that promote critical use of technology in educational interventions. A survey using a scale based on thinking moves for the use of the internet and social media was designed and given to in-service primary school teachers (n=536) from various autonomous communities. The data collected were analysed descriptively. In addition, an analysis of variance and Student's *t*-test were performed. The results of the study suggest that there seems to be little planning of classroom activities for the subject under study. 90.6% teachers recognised that they planned few activities, or no activities at all, on disinformation. This may be the result of the lack of relevant teacher training. What is more, in the use of technology tools, mostly low-level cognitive strategies are encouraged. In their conclusions, the authors draw attention to the versatility of the scale designed and suggest integrating multiple thinking-based approaches, e.g., visible thinking, to enable teachers to learn how to promote critical thinking strategies beyond being wary of digital media.

Key words: disinformation, misinformation, teaching skills, critical thinking, media and information literacy, primary education.

Resumen

En el siglo XXI las *fake news*, la desinformación y la infoxicación son cada vez más populares. Internet y las redes sociales contribuyen a este crecimiento. Para hacer frente a esta situación, las intervenciones educativas de los docentes de Educación Primaria deben permitir que los alumnos conozcan esta problemática y desarrollen habilidades basadas en el pensamiento crítico para ser menos vulnerables a los medios digitales. La educación en medios tecnológicos no puede quedar reducida a los aspectos de uso y manejo. En este estudio se ha seguido un diseño metodológico cuantitativo para analizar la percepción del profesorado de Educación Primaria sobre sus prácticas de aula para promover el uso crítico de los medios tecnológicos en sus intervenciones educativas. Para ello, se ha diseñado una escala basada en los movimientos del pensamiento frente al uso de Internet y las RRSS. Ha sido cumplimentado por parte de los maestros en activo (n=536) de diferentes comunidades autónomas a las que se ha tenido acceso. Los datos recopilados se han analizado de manera descriptiva, y también se ha realizado un análisis de varianza y la prueba t de Student. Los resultados muestran que la planificación de actividades sobre el fenómeno de estudio en el aula parece ser escasa, pues un 90,6% de los profesores reconocen que planifican poco o nada actividades sobre la desinformación, pudiéndose deber a la necesidad de formación del profesorado. Además, en los diferentes cursos de la etapa se promueven principalmente estrategias de baja demanda cognitiva frente a los usos de los medios tecnológicos. Se concluye destacando la versatilidad de la escala diseñada, así como se propone la integración de enfoques basados en el pensamiento, como el pensamiento visible, para que los

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docentes aprendan a promover estrategias de pensamiento crítico más allá de transmitir al alumnado que desconfíen de los medios digitales.

Palabras clave: desinformación, prácticas de aula, pensamiento crítico, alfabetización mediática e informacional, educación primaria.

Introduction

The rise of the internet and social media has increased the circulation of fake news and disinformation, at a time when multimedia devices are ever-present in everyday life (Buckingham, 2019; Gutiérrez & Tyner, 2012). Thus, the society of knowledge is giving way to the society of disinformation and information overload (Amorós, 2018). Romero-Rodríguez, Pulido & Rodríguez (2019) mention some of the risks of the inadequate use of digital media: information pollution and overload, fake news, clickbaits, and so on. According to Gutiérrez & Torrego (2018), this transforms citizens into digital castaways when it comes to using the internet or social media.

In the field of education, the need for both educators and students to develop critical thinking skills in the age of misinformation has become apparent, in order for them to handle the risks entailed by the use of digital media (Buckingham, 2019). To help students to acquire these skills, educators should be digitally literate first. The need for education to offer a way of neutralising the risks of fake news and disinformation is part of today's public debate (McDougall, Brites, Joao & Lucas, 2019).

However, as explained by Gutiérrez (2021), digital media are often used as learning resources rather than being the subject of critical analysis themselves. Educational interventions tend to focus on technology-related aspects instead of ideological or aesthetic concerns (Mateus, Hernández-Breña & Figueras-Maz, 2019).

Why should educators encourage the acquisition of skills that help students make critical use of media? According to Cebrián-Robles (2019), the fact that students have digital skills does not mean they are responsible, critical users of the internet and social media. Romero-Rodríguez et al. (2019) have coined the term *analfanautas* (illiterate net

surfers) to refer to users of information and communication technologies who lack the necessary skills to use these technologies adequately (p. 387). *Analfanautas*: (a) are proficient in technical and instrumental uses of technology; they have deep knowledge of platforms, devices and social media; (b) are loaded with more content than they can process – a situation leading to information overload; (c) prefer pseudo-information when consuming information on social media or digital platforms; and (d) tend to share content without analysing it first (Romero-Rodríguez et al., 2019).

In their review of the literature, Parra & Oliveira (2018) mention the solutions proposed for misinformation. These include media and information literacy. While information literacy "emphasises the importance of access to information and the evaluation and ethical use of such information" (Wilson, Grizzle, Tuazon, Akyempong & Cheung, 2011, p. 18), media literacy "emphasises the ability to understand media functions, evaluate how those functions are performed and to rationally engage with media for self-expression" (Wilson et al., 2011, p. 18). Lee (2018) and Shu et al. (2020) both suggest that media and information literacy can help mitigate the effects of disinformation and misinformation at an early age. According to García-Ruiz & Pérez-Escoda (2020), a new curriculum approach is needed to face this challenge and move towards critical media and digital literacy.

Ennis defines critical thinking as "reasonable reflective thinking focused on deciding what to believe or do" (1996, p. 166). Machete & Turpin construe the concept as "the ability to analyse and evaluate arguments according to their soundness and credibility, respond to arguments and reach conclusions through deduction from given information" (2020, p. 4). In both definitions, the emphasis is on reasonableness, reflection and the process of decision making (Ritchhart & Church, 2020).

Given these broad definitions, one could ask what the ideal critical thinker should be like. This study draws on the visible thinking approach, aimed at uncovering students' thinking on thinking and helping them develop metacognitive strategies (Ritchhart, 2015). One of the tools made available in this approach is thinking moves, i.e., the fundamental cognitive abilities involved in understanding, problem solving, decision making and judgement (Ritchhart, Church & Morrison, 2014): (a) observing closely and describing what is there; (b) building explanations and interpretations; (c) reasoning with evidence; (d) making connections;

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(e) considering different viewpoints and perspectives; (f) capturing the heart and forming conclusions; (g) wondering and asking questions; and (h) uncovering complexity and going beyond the surface of things. These abilities can be associated with Castellví's state of alert (2019), i.e., the state of doubt and reflection when faced with information and social issues, as well as the continuous review of the underlying criteria.

The use of critical thinking against fake news, disinformation, misinformation, clickbaits and information overload has been dealt with in the literature (Díaz & Hall, 2020; Gallardo-Camacho & Marta-Lazo, 2020; Herrero-Diz, Jiménez, Frade & Aramburu, 2019; Machete & Turpin, 2020; Weiss, Alwan, García & García, 2020). The studies reviewed by Bronstein, Pennycook, Bear, Rand & Cannon (2018) show that belief in fake news is associated with reduced analytical thinking. Likewise, McDougall (2019) submits that fake news, disinformation or information overload are not an issue in themselves; the issue is the lack of critical thinking skills to face today's society. In the words of Jiménez, "if students do not develop the dispositions and skills required to deal with this type of information, the societies of the future will fall easy prey to manipulation, unable to identify fake news" (2020, p. 13).

In light of this, educators should be capable of empowering students in the age of misinformation, promoting the use of thinking moves to go beyond "what browsers show on their home pages" (Ernesto, 2013, p. 116). Accordingly, they must know how to promote "critical thinking in students, enabling them to identify and pick reliable information, as well as to classify and organise such information" (Gómez-Pablos, Muñoz-Repiso, Martín & González, 2020, p. 517). Once they learn how to identify the nature of the information they are dealing with, students can identify the point of view and other choices made by authors. Teachers should help them analyse and evaluate the information they are faced with, no less because the future of democracy hinges on their ability to do so (Hobbs, 2017; Hoechsmann, 2019). Critical thinking promotes "active, responsible and critical citizenship, as well as the ethical values need to make progress, both individually and socially" (Ventura, 2019, p. 71).

For students to achieve media and digital literacy, educators should resort to classroom practices designed for this purpose. The United Nations Educational, Scientific and Cultural Organization (UNESCO) has published a media and information literacy (MIL) curriculum for educators and learners under the title *Media and Information Literate*

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Citizens: Think Critically, Click Wisely! (Grizzle et al., 2021). MIL learning outcomes include: to critically evaluate information, media and digital content; to analyse, share, organise and store information, media and digital content; to synthesise or operate on the ideas abstracted from information and media content; and to be able to protect oneself from risks online in relation to software, content, contacts and interaction, among others.

Against this background, and drawing on the concept of thinking moves, this study aims to:

- Design a tool to analyse educators' classroom practices to promote critical thinking in students when dealing with information in the use of the internet and social media.
- Analyse primary school teachers' self-perceptions regarding these issues.
- Consider the implications of the results obtained in the design of a teacher training proposal.

Method

This is a quantitative non-experimental study, following a cross-sectional design with a descriptive and inferential scope, gathering and analysing data to describe the phenomenon under study on the basis of in-service primary school teachers' perceptions (Hernández, Fernández & Baptista, 2018).

Sampling

The participants in this research study (n=536) were selected following the snowball sampling method, as the link to the data collection tool was sent by email to educational centres listed on the directories of autonomous communities/cities in Spain. The educational centre authorities were asked to share the survey with the educators in their school. Table I shows a description of the sample used in the study.

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TABLE I. Sample description

	GENDER		AGE		GRADE LEVEL					
	Men	Women	Mean	SD	1st	2nd	3rd	4th	5th	6th
Research (n=536)	29.70%	70.30%	43.48	9.49	11.20%	7.70%	9.30%	3.30%	11.60%	29.30%

Source: Own elaboration

Participants included educators from various autonomous communities/cities, mainly Madrid (34.90%), Castile-León (14.51%), Andalusia (10.59%), Asturias (9.41%), Canary Islands (6.67%), Aragon (6.67%), Murcia (6.27%) and Basque Country (4.31%).

Tools

For data collection, a Likert-type four-category scale was devised (where 1 meant "Strongly disagree" and 4 meant "Strongly agree"). Responses were collected between September and December 2021, using Microsoft Forms.

The scale included a set of items based on Ritchhart & Church's thinking moves (2020), adapted for misinformation in the use of the internet and social media, taking into account the contributions made by Amorós (2018), Hobbs (2017), Jiménez (2020) and Gutiérrez (2021). Sociodemographic items were added for sample description purposes, in addition to relevant general items.

A preliminary survey was devised and tested among 10 educators. The pilot test showed the scale had an adequate number of items (14 to 20). Some of the items were rephrased to make them easier to understand, while others were deleted. In its final version, the survey included 4 sociodemographic questions (age, gender, province and grade level), 3 general items ("I think the subject of fake news, disinformation and information overload should be addressed at the stage in which I teach"; "I plan activities or strategies to address fake news, disinformation and information overload for my educational interventions with my students"; "I'd like to get further training on fake news, disinformation and information

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overload to be able to address this subject in the classroom") and 15 items focusing on cognitive strategies (see Table II).

The scale was validated by 6 judges – experts, researchers, and university and non-university educators with an average age of 43 and at least 15 years' professional experience.

After the survey responses for the total sample were collected, the properties of the measurement tool – titled Critical Thinking for Digital Media Classroom Practices Scale (CTDMCPS) – were analysed in depth. For internal consistency, Cronbach's alpha was used. The high value – .97 – indicated internal consistency. In addition, the method of exploratory factor analysis (EFA) was used to uncover the underlying structure of the variables used. Further tests confirmed the validity of this analysis (KMO=.96; chi-square=7036.505, SIG=.000), which showed that the scale had one main factor – Critical thinking –, accounting for 67.12% total variance (see Table II). This factor includes the various cognitive strategies involved in the development of critical thinking in students.

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TABLE II. Scale items

	Component	Factor
Identify the various viewpoints and perspectives in the information found when surfing the internet.	.876	Critical thinking
Check the reliability of the most viral or repeated information on the internet.	.869	
Analyse the reliability of information sources (websites).	.858	
Check authors and sources for the information found on the internet.	.843	
Give evidence of the consistency or the reliability of the information found on the internet.	.841	
Read beyond attention-grabbing headlines or images on the internet.	.839	
Identify biases in the information found and shared on the internet, based on one's own beliefs or feelings.	.839	
Ask questions about the information found on the internet.	.825	
Make connections between different pieces of information found on the internet.	.809	
Summarise and get the gist of the information found on the internet.	.808	
Check publication dates for the information found on the internet.	.808	
Compare and contrast information across websites.	.801	
Identify ideologies, biases and assumptions underlying the information shared on the internet.	.768	
Share information found on the internet only after checking that it is reliable.	.753	
Distrust the information published on the internet.	.738	
Eigenvalues	10.07	
% variance explained	67.12	
% cumulative variance explained	67.12	
KMO	.963	
Bartlett's Test of Sphericity	Chi-square=7036.505; SIG=.000	

Source: Own elaboration

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The questionnaire's validity was checked with a confirmatory factor analysis (CFA) for the survey's 15 items, using a one-factor model. The results are shown in Table III. The chi-square value is statistically significant, mainly due to sample size. Moreover, the root mean square error of approximation (RMSEA), as a mechanism for adjusting for sample size, reveals that the model adequately fits this kind of measurements (Browne & Cudeck, 1993). The values for the goodness of fit index (GFI) and the adjusted goodness of fit index (AGFI) – absolute fit indices – exceed the minimum of .9 generally indicating acceptable model fit (Bentler & Bonett, 1980). As to the normed fit index (NFI) and the non-normed fit index (NNFI), analysing the discrepancy between the chi-squared value ($\chi 2$) of the hypothesised model and the chi-squared value of the null model, their values are above the cutoff of .90 or greater indicating good model fit (Bentler & Bonett, 1980; Bollen & Long, 1993). Finally, as to the AGFI value – same index as GFI but adjusted for degrees of freedom –, it is close to 1 (perfect fit) and way above 0.8 (acceptable model) (Bentler & Bonett, 1980).

Based on the EFA measurements described above, it can be concluded that CTDMCPS is a valid construct.

TABLE III. Confirmatory factor analysis

	MEASUREMENTS						
	Absolute fit indices		**Incremental fit indices**				**Parsimony-adjusted measures**
	$\chi 2$	**RMSEA**	**GFI**	**CFI**	**NFI**	**NNFI**	**AGFI**
Factor analysis model of CTDMCPS for one factor of interest	224.31 (SIG = .000)	.058	095	.99	.99	.99	.92

Source: Own elaboration

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Data analysis

The quantitative analysis includes a statistical description of the relevant variables and an inferential mean difference comparison after variable standardisation, analysis of variance (ANOVA) and Student's *t*-test for related samples. All statistical analyses were performed with SPSS Statistics, version 26.0. To check the reliability and validity of the measurement tool, SPSS 26.0 was used along with LISREL 8.80, a statistical software package used in structural equation modelling.

Results

Firstly, a descriptive analysis was performed of the initial questions in the survey. The results are evidence of the little work done in the classroom in connection with fake news, disinformation and information overload ($\overline{X}$=1.92, SD=.84). 90.6% participants either strongly disagreed or barely agreed with the planning of activities in this area, although they considered the subject to be relevant in primary education ($\overline{X}$=3.11, SD=.83). 84.5% quite agreed or strongly agreed with the latter. These results could be accounted for by the training shortcomings in the area ($\overline{X}$=2.90, SD=.84). In fact, 60.7% respondents quite agreed or strongly agreed with getting further training.

The Student's *t*-test applied to related samples showed that mean differences were statistically significant between the importance attached and the planning of activities ($t_{(2)}$=13.77; SIG=.000), the importance attached and training ($t_{(2)}$=4.18; SIG=.000), and training and activity planning ($t_{(2)}$=9.90; SIG=.000).

Secondly, the 15 items related to cognitive strategies were analysed descriptively. The items with the highest frequency were "Distrust the information published on the internet" ($\overline{X}$=2.91, SD=.97), "Read beyond attention-grabbing headlines or images on the internet" ($\overline{X}$=2.66, SD=.95) and "Ask questions about the information found on the internet" ($\overline{X}$=2.63, SD=.92), whereas those with the lowest frequency were "Give evidence of the consistency or the reliability of the information found on the internet and social media" ($\overline{X}$=2.16, SD=.95), "Identify biases in the information found and shared on the internet and social media, based on one's own beliefs or feelings" ($\overline{X}$=2.15, SD=.94) and "Identify ideologies, biases

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and assumptions underlying the information shared on the internet and social media" ($\overline{X}$=2.14, SD=.96) (see Table IV). These results show that the strategies promoted are those with a low level of complexity or cognitive demand (see Table IV).

TABLE IV. Total scale scores and percentage of responses

Scale item	Mean	Standard deviation	Never (%)	Occasionally (%)	Often (%)	Very often (%)
Distrust the information published on the internet.	2.91	.97	10.0	21.7	35.6	32.7
Read beyond attention-grabbing headlines or images on the internet.	2.66	.95	13.2	28.1	37.8	20.9
Summarise and get the gist of the information found on the internet.	2.63	.92	14.4	27.4	42.1	16.1
Ask questions about the information found on the internet.	2.60	.93	12.8	29.7	38.8	18.7
Check the reliability of the most viral or repeated information on the internet.	2.44	.98	19.7	32.7	31.3	16.3
Check authors and sources for the information found on the internet.	2.41	.99	21.3	31.9	31.1	15.7
Analyse the reliability of information sources (websites).	2.39	.98	20.7	34.6	29.3	15.4
Compare and contrast information across websites.	2.35	.98	21.7	36.2	27.2	15.0

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Identify the various viewpoints and perspectives in the information found when surfing the internet.	2.33	.95	22.4	33.3	32.9	11.4
Check publication dates for the information found on the internet.	2.29	.96	22.8	38.2	26.0	13.0
Share information found on the internet only after checking that it is reliable.	2.27	1.02	28.7	28.9	28.7	13.6
Make connections between different pieces of information found on the internet.	2.23	.94	24.6	38.0	27.0	10.4
Give evidence of the consistency or the reliability of the information found on the internet.	2.16	.95	29.3	35.2	26.0	9.4
Identify biases in the information found and shared on the internet, based on one's own beliefs or feelings.	2.15	.94	28.5	37.8	24.0	9.6
Identify ideologies, biases and assumptions underlying the information shared on the internet.	2.14	.96	30.5	35.4	24.0	10.0

Source: Own elaboration

Interestingly, the percentages of "Often" and "Very often" responses shown in Table IV reveal that 68.3% participants consider they encourage students to be wary of the information published on the internet. Likewise, 58.7% believe they urge students to read beyond attention-grabbing headlines or images, while 58.2% insist on the importance of summarising the information found online.

On the other hand, 61.0% participants "Never" or only "Occasionally" focus on the publication dates of the information published online; 64.5%

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"Never" or only "Occasionally" insist on giving evidence of how consistent or reliable the information read online is; and 65.9% "Never" or only "Occasionally" promote the identification of underlying ideologies, biases and assumptions.

The average total score on the scale is 35.98 (SD=11.82). Table V shows the average total score for each grade in primary education. The score for the promotion of critical thinking strategies is higher for higher grades. The analysis of variance for one factor reveals that the differences are statistically significant.

TABLE V. Total scale scores by primary education grades

Primary education grade	Mean	Standard deviation	DF	F	SIG
1st	30.26	11.64	5	11.715	.000
2nd	31.41	10.74			
3rd	31.57	9.93			
4th	34.82	13.88			
5th	36.39	10.34			
6th	40.79	10.98			

Source: Own elaboration

On the basis of these results, it was analysed whether more emphasis was laid on certain cognitive strategies than on others, either throughout the stage as a whole or in individual grades. However, the promotion of strategies in all grades matches the results shown in Table IV, the average total score being higher for higher grades.

Likewise, as expected, the analysis of variance for one factor shows that the total score for the promotion of cognitive strategies is higher when there is more planning of classroom activities on fake news, disinformation and information overload (see Table VI).

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TABLE VI. Relationship between activity planning and cognitive strategies

Planning strategies or activities to raise awareness of fake news, disinformation and information overload	Mean	Standard deviation	gDF	F	SSIG
Strongly disagree	29.93	11.12	3	43.407	.000
Barely agree	36.86	9.99			
Quite agree	41.05	10.98			
Strongly agree	50.88	9.71			

Source: Own elaboration

Conclusions

The ubiquity of the internet and social media in everyday life means greater access to knowledge and communication, but also greater risks in terms of information pollution, fake news and clickbaits (Romero-Rodríguez et al., 2019). Educational centres and teachers play a key role in facing these risks, teaching the thinking skills and dispositions required for critical use of media. In line with this, the European Union promotes the development of a high-performing European digital education system and seeks to enhance citizens' competences and skills for the digital transition (European Education Area, 2021). Likewise, UNESCO lists seven media and information literacy (MIL) competences for teachers (Grizzle et al., 2021):

1. Understanding the role of information, media and digital communications in sustainable development and democracy.
2. Understanding content and its uses.
3. Accessing information effectively and efficiently and practising ethics.
4. Critically evaluating information and information sources and ethical practices.
5. Applying digital and traditional media formats.
6. Situating the sociocultural context of information, media and digital content.

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7. Promoting MIL among learners/citizens and managing required changes.

These competences are needed to promote critical use of digital media among primary school students. In fact, the goal of stage (1) set forth in Organic Law 2/2006, of 3 May, on Education (LOE), amended by Organic Law 3/2020, of 29 December, is to develop students' ability to "get started in the use of information and communication technologies and to build critical thinking to analyse the messages they receive and produce". With such an ambitious goal, we need to be aware of its implications in the classroom.

Moving towards this goal, this study involved the design and validation of a tool to assess teachers' classroom practices promoting critical thinking in the use of the internet and social media. The tool – a scale – has such psychometric properties that make it valid and reliable. The scale can serve a variety of purposes: (1) for the institutions designing initial and in-service teacher training plans, the survey can offer valuable data for efficient planning, enabling them to identify areas for improvement in the knowledge of specific strategies to promote critical use of media in students; (2) for teacher training centres, it can help identify changes in teacher training and show evidence of improvement; (3) for teachers, it can be a checklist used to plan and check the critical thinking strategies promoted among students in the use of media; and (4) for learners, it can be an information management checklist for research and other learning projects.

In addition, the study analyses primary school teachers' self-perceptions in connection with the development of classroom practices to train critical users of digital media. The survey reveals that most teachers do not plan activities to promote the acquisition of specific cognitive strategies to analyse the information found on the internet and social media, even if they consider this to be very important and are interested in getting relevant training. These results concur with the findings of Gretter & Yadav (2018) and Gutiérrez-Martín, Pinedo-González & Gil-Puente (2022), where educators state that they lack training in media literacy, an issue they consider to be highly relevant in today's world.

In light of these results, special and practical training is needed for educators to be able to face educational challenges in a post-truth society – a kind of training that is consistent with the EU approach (European Education Area, 2021) and with the conclusions of current scientific

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studies (Barzilai & Chinn, 2020; Mateus, 2021). Although this study does not explore the reasons why teachers do not include critical thinking strategies as part of their learning activities, it could be posited that the failure to do so is related to the lack of adequate training and, thus, of the relevant skills. As stated by Swartz, Costa, Beyer & Reagan (2018), critical thinking skills can be infused with any content. Therefore, if a teacher is adequately trained to promote critical thinking strategies, they can use them with all kinds of curriculum content (e.g., Science or Mathematics), as well as with content found on the internet or in social media (e.g., fake news).

When analysing teachers' self-perceptions in connection with the promotion of cognitive strategies for critical use of media at the level of information, it can generally be observed that teachers resort to cognitive strategies to help students analyse the information found in digital media only occasionally, especially those strategies with a higher level of cognitive complexity (e.g., "Give evidence of the consistency or the reliability of information" or "Identify biases in the information found and shared on the Internet and social media, based on one's own beliefs or feelings").

The strategy most commonly promoted seems to be the distrust of the information published on the internet. This is important, as it could be the starting point for other strategies leading to an in-depth critical analysis of media information: if there is no distrust, there can be no move towards checking the truthfulness of information. However, this is a low-level cognitive strategy, associated with a protective or preventive approach against the risks of digital media (Botturi, 2019). Therefore, it is not an effective tool for empowering students to face the risks posed by information. Moreover, an excess of distrust could damage the learning process, as digital media also contain trustworthy information (Amorós, 2018).

The study also considers if the promotion of specific cognitive strategies for critical use of media changes according to grade levels, finding that teachers devote more effort to this area in higher grades, especially fifth and sixth grades. However, even in higher grades, the cognitive strategies preferred are still superficial instead of more complex ones. It would be preferable for teachers to focus on higher-level strategies in higher grades, enabling learners to perform more sophisticated analyses of the information they read (Ritchhart & Church, 2020). Still, although the need

for critical thinking skills is more urgent in higher grades, it should be borne in mind that today the use of digital media, including social media, begins at an early age (INE, 2021), which means that work on adequate strategies should begin in first grade.

Primary school students are frequent users of the internet and social media – even of those media that are not fit for their age. This is a fact that school communities, and teachers in particular, cannot ignore. What could happen if they were not taught cognitive skills frequently? They could settle for the first information they found on the internet or in social media, failing to compare it to other pieces of information and failing to check who shared such information and when, thus spreading wrong or biased information. For instance, summarising and getting the gist of the information found on the internet would not be enough if the information were not true or had not been checked. This, in fact, would make children even more vulnerable to the risks of misinformation.

Finally, the study reflects the relationship between the planning of learning activities in the area under study and the development of cognitive strategies. This relationship highlights the need to address media and digital literacy in the classroom, with specific goals and activities, and in coordination with colleagues at the educational centre (Aguaded, Marin-Gutiérrez & Díaz-Parejo, 2015; Alonso-Ferreiro & Gewerc, 2018; Kerslake & Hannam, 2022; Mateus, 2021; Sánchez-Carrero, 2020).

A training proposal should be put forward to enable teachers to promote critical thinking strategies in students, thus helping them fight disinformation and other dangers. This study offers a measurement tool and useful data to move in this direction. The scale can be used by teachers as a list of strategies to be developed in the context of a teaching unit or a classroom project. In addition, they could use the visible thinking approach and its thinking routines in situations of misinformation, to create real-life or fictional scenarios where the use of technology requires the development of strategies, and so on. The proposal is in line with the COMPROMETIC model put forward by Gutiérrez-Martín et al. (2022). Also, the UNESCO MIL Curriculum offers methodological strategies that can be used as a reference in the classroom (Grizzle et al., 2021).

As to the limitations of the study, the sampling method used does not guarantee a random or a representative sample; neither does it ensure control of how the sample is formed. Moreover, a larger sample could be used. Future lines of research could look into the impact of training

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proposals based on critical thinking in the use of digital media on disinformation, information overload and other phenomena. In addition, similar studies could be conducted in other levels of education (e.g., secondary education, Spanish Baccalaureate, basic occupational training, etc.)

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Gender and regions in the vicious circle of school failure [1]

Género y territorio en el círculo vicioso del fracaso escolar

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Abstract

This article analyses the regional and gender situation of compulsory education in Spain, in line with the Sustainable Development Goals (SDGs) and considering two important aspects: on the one hand, detecting basic deficiencies, coining the term educational poverty; on the other hand, measuring recent evolution, introducing the idea of progress. METHOD. As variables, we take school enrolment at two years of age, suitability rates at 12 and 15 years of age, school failure, and early school leaving, in 2008 and 2018, as well as the percentages of low performers in Mathematics and Science in PISA 2018. Given the targets for each variable, related to the 2020 Strategy, as well as

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scarcity thresholds, we define both progress and poverty indexes, using data from the Ministry of Education and Vocational Training 2020 and the PISA 2018 report. RESULTS: Females perform better than males in all variables except PISA Mathematics. The Canary Islands, Murcia, the Valencian Community, and Extremadura showed extreme educational poverty in 2018. The regions of the Cantabrian coast and Catalonia did not show poverty. The regions worst placed in poverty made the least progress over the period, although all regions did make progress. DISCUSSION AND CONCLUSIONS: The concepts of poverty and educational progress provide a nuanced view of the situation and problems of compulsory education. Differences between Spanish regions are maintained over the period, with a very weak Beta convergence. The gender differences detected may respond to deeply rooted socio-economic roles. Early education appears as an important element to improve later outcomes. Productive specialization and economic status influence early drop-out. Reducing poverty figures requires measures involving the holistic development of the student.

Keywords: educational improvement, educational poverty, compulsory education, gender differences, regional differences

Resumen

En este artículo analizamos la situación regional y con perspectiva de género de la educación obligatoria en España, de acuerdo con los Objetivos de Desarrollo Sostenible (ODS), considerando dos aspectos importantes: por una parte, detectando las carencias básicas, acuñando el término pobreza educativa; por otra, midiendo la evolución reciente, introduciendo la idea de progreso. MÉTODO. Como variables, se toman la escolarización a los dos años, tasas de idoneidad a los 12 y 15 años, fracaso escolar, y abandono educativo temprano, en 2008 y 2018, así como los porcentajes de bajo desempeño en PISA 2018 en Matemáticas y Ciencias. Fijados unos objetivos en cada variable, relacionados con la Estrategia 2020, así como umbrales de escasez, definimos un índice de progreso y pobreza, utilizando los datos del Ministerio de Educación y Formación Profesional 2020 y del informe PISA 2018. RESULTADOS: Las mujeres presentan mejores resultados que los hombres en todas las variables, salvo en PISA Matemáticas. Canarias, Murcia, la Comunidad Valenciana y Extremadura presentan pobreza educativa extrema en 2018. Las regiones de la cornisa Cantábrica y Cataluña no presentan pobreza. Las regiones peor situadas en pobreza son las que han progresado menos en el periodo, aunque todas las regiones han progresado. DISCUSION Y CONCLUSIONES: Los conceptos de pobreza y progreso educativos permiten obtener una visión matizada de la situación y problemas de la educación obligatoria. Las diferencias entre las regiones españolas se mantienen en el periodo, con una Beta convergencia muy débil. Las diferencias de género detectadas pueden responder a roles socioeconómicos fuertemente arraigados.

La educación temprana aparece como un elemento importante para mejorar los resultados posteriores. La especialización productiva y la situación económica influyen en el abandono temprano. La reducción de las cifras de pobreza requiere medidas que impliquen el desarrollo integral del alumno.

Palabras clave: progreso educativo, pobreza educativa, educación obligatoria, diferencias de género, diferencias regionales

Introduction

The United Nations Sustainable Development Goals (SDGs) highlight the necessary transformations that societies face in social, economic, and environmental spheres. The achievement of these goals has turned human capital, in terms of acquired knowledge, into the most crucial asset in neighbouring countries (Ortega & Cortés, 2017). At the same time, profound changes are appearing in the learning and teaching processes, as well as new forms of knowledge and skills linked to technological changes and new forms of social interaction (Crittenden et al., 2019).

Education is the instrument that most powerfully contributes to a country's progress, social mobility, and equity. Only a society with sufficiently knowledgeable citizens can harness the dissemination and use of new technologies (Hanushek & Woessmann, 2011). The relationships between knowledge, education, and job opportunities, both at the individual and societal level, and their contribution to the growth and progress of countries are well documented and studied (Karasiotou, 2012).

However, for education to play a relevant role in individual and social progress, it needs to promote equal opportunities (González & Marcenaro, 2018). Education in the early stages of life is one of the elements currently in the spotlight, as achieving an adequate education in adulthood largely depends on the quality of the initial training received. This stage is when the neurophysiological bases that determine later psychological processes are structured (Gutiérrez & Ruiz, 2018), an aspect that has crucial influences on later academic results, health, and well-being (Sims, 2020).

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Among the SDGs for 2030, Targets 4.1 and 4.2 include, first, ensuring that every girl and boy has access to quality early childhood care and development services and preschool education. Second, ensuring that they complete primary and secondary education levels within free, equitable and good quality standards. And, third, producing effective learning outcomes. In turn, SDG5 stresses the need to achieve gender equality and women's empowerment. In particular, in education, positive differences in favour of women are identified, which, however, do not translate into the labour market (Dancausa et al., 2021).

Compulsory education in Spain is problematic in several respects. Education policies depend on autonomous communities, and among them, economic heterogeneity leads to differences in resources to finance public education (López et al., 2016; González & Marcenaro, 2018). Moreover, the contrast in production structures and the labour market between regions influence dropout rates and the quality of education (Oliver & Roselló, 2019). On the other hand, the Spanish educational system, unlike its neighbours, suffers in some significant aspects, such as the high repetition rate, the high dropout rates, and the improvable results in the PISA tests (Choi & Calero, 2013). Nevertheless, recognizing that PISA is a benchmark of great international weight, its validity and reliability should be interpreted with caution (Fernández-Cano, 2016).

The importance of early schooling on cognitive development, social behaviour, and emotional maturity are well known (Bakken et al., 2017). In particular, this factor is essential for children from disadvantaged backgrounds (Ansari et al., 2019) as well as for later academic success (Shala, 2013), especially in the case of immigrant children (Corazzini et al., 2021). The relevance of acquiring particular skills for later numerical development is also highlighted (Cahoon et al., 2021).

Several studies support the importance of learning and success in school at the 12-15 years stage for developing future skills, career aspirations, and success in accessing the labour market (Basler & Kriesi, 2019; Manić & Trajković, 2019). Delay and grade repetition have significant effects on students' motivation (Cabrera et al., 2019) and lead to and accentuate social inequalities (González & Marcenaro, 2018), especially among immigrants (Bayona-i-Carrasco & Domingo, 2021), and therefore represent a critical barrier to equity. Spain has the highest grade repetition rates in the Organisation for Economic Cooperation and Development (OECD) countries (Cabrera et al., 2019).

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A worrying element of the Spanish situation is the so-called administrative school failure, i.e. people who finish compulsory schooling without obtaining the ESO [Compulsory Secondary Education] diploma. This leads to high levels of social and labour market exclusion (Antelm et al., 2018).

School failure is closely related to the high number of young people who leave education early, with fatal consequences for future employment and personal development, as well as for the productive system and human capital of society (Calero & Fernández 2012; Fernández & Calero, 2014). Therefore, reducing early school dropouts poses a challenge for educational policies. Not in vain, it fundamentally affects the most vulnerable groups with labour market insertion among their greatest problems, and is the main factor of exclusion in the Spanish education system.

This paper analyses the situation of compulsory education in Spain in its most essential aspects. Looking at the basic indicators (participation rates; suitability; attainment of the Compulsory Secondary Education [ESO] certificate; PISA test results; early drop-out), two questions arise:

- How different is the situation between autonomous communities? Is there a sufficient basic level of education? And are there communities whose results are clearly below expectations?
- What has been the situation's evolution within the communities in recent years? Can it be said that all regions have made positive progress in their basic educational outcomes? Which regions have progressed the most?

At the same time, this article aims to provide a gender perspective on the compulsory education situation, analysing the differential situation of both sexes.

To answer these questions, two novel concepts – educational poverty and educational progress –are introduced. It is important to note that these concepts refer to societies, not individuals, unlike those related to material poverty.

We start by considering that poverty is partly associated with what the OECD calls the "vicious circle of school failure", understood as a cumulative process of disengagement from the education system, comprising different ages, and various manifestations.

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This paper focuses on Spain's early compulsory schooling and its situation in the different autonomous communities. In this sense, basic education understood as a dynamic process leads to several critical milestones being closely considered: Early education (before the compulsory stage), the end of primary education, and the end of secondary education (ESO)

Method

Variables

Generally speaking, educational deprivation (or poverty) in a society with universal access to compulsory education is often associated with functional illiteracy, school failure, and early drop-out from education and training. However, in this cumulative process, we will also consider the extension of early schooling (2 years), adequate progress in primary and secondary education, and the acquisition of sufficient levels of competencies in reading comprehension, mathematics, and science.

The Ministry of Education and Vocational Training provides annual statistics on variables that approximate the above-mentioned: *education rates at age 2, suitability rates at ages 12 and 15, school failure, and early dropout* (Ministry of Education and Vocational Training, 2020). These variables, corresponding to 2008 and 2018, are used to calculate educational progress. Each variable depends on two bounding parameters. The first, the target is determined by the 2020 Strategy. The second, the poverty threshold ranges between 10 and 20% below the target depending on the data.

We use PISA data as the most appropriate source to approximate the sufficient acquisition of reading literacy, mathematics, and science for Spanish regions in a comparable way. The PISA 2018 results in mathematics and science are used, together with data on the above variables in 2018, to analyse poverty. The selected poverty thresholds link to the OECD average proportion of low-performing students in the PISA variables.

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Measuring educational poverty

The concept of material poverty is linked to the lack of essential goods (or the ability to acquire them) by particular individuals in a population. When considering poverty income, a certain threshold is defined, below which the population is considered "poor". This threshold starts at 60% of the country's average income within developed countries. Recently, multidimensional indicators of material poverty have been developed, such as the AROPE (At Risk of Poverty and Social Exclusion) defined by the European Union in the Europe 2020 Strategy based on data provided by the EU-SILC (European Union Survey on Income and Living Conditions). The United Nations considers a multidimensional concept of poverty in which unmet basic needs are specified, including elements of health and education, as households with out-of-school children or insufficient schooling years (United Nations Development Programme [UNDP], & Oxford Poverty and Human Development Initiative [OPHI], 2021). Both indicators consider the accumulation or existence of any deprivation at the individual or household level and count the number of individuals or households living in poverty.

This paper applies a similar methodology to assess the situation of compulsory education at a societal level (Spain and its autonomous communities). To do so, and for each of the variables that "monitor" the evolution of educational deprivation, we define a threshold delimiting the figures that society should not exceed. Poverty, in this case, is measured in a given year, 2018. Any community under review qualifies as poor in a given variable when it does not reach a predetermined level which we will call the poverty threshold for that particular variable.

A society must show significant deprivation in at least three of the seven selected indicators to be considered poor in education. A society presents extreme poor conditions with deprivation in 6 or 7 of the selected indicators, medium poor if it is in 3-4-5 of them, and weakly poor if it is in 2 or fewer indicators.

Measuring educational progress

We measure progress by looking at relative differences in the variables considered over the last ten years. Progress is present if advancements

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are in the right direction. We understand it to be fulfilled (index 1) if it achieves the target proposed in the 2020 Strategy. Specifically, we consider the values of the corresponding variables at two points in time, in our case, t_1=2008; t_2=2018, as well as the target value of the indicator. We use these data to build a progress index as follows:

If the indicator (variable) is such that it is good to increase its values over time,

$$I = \min\{1, \frac{v(t_2) - v(t_1)}{Ob - v(t_1)}\}$$

If the indicator is such that it is good to decrease its values over time,

$$I = \min\{1, \frac{v(t_1) - Ob}{v(t_1) - v(t_2)}\}$$

Note that the index is always between 0 and 1. It reaches a value of 1 when the target has been reached (or exceeded). On the other hand, we can speak of beta convergence when regions that start low at one particular variable progress more than those whose initial data are better (Sala-i-Martín, 2000).

Table I specifies the variables considered and the targets for measuring progress and poverty lines.

TABLE I. Variables, progress targets, and poverty thresholds

	Target	**Poverty threshold**
Enrolment rates at age 2	90.0%	60.0%
Suitability rate at age 12	95.0%	85.0%
Suitability rate at age 15	90.0%	75.0%
Students lagging behind in mathematics		22.0%
Students lagging behind in science		21.0%
Gross rate of population completing secondary education *	85.3%	75.0%
Early school leaving rate	10.0%	20.0%

* Complementary to the school failure rate
Source: Own elaboration.

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Data sources

Territorial and gender disaggregation is available for the rest of the variables considered, except for enrolment rates in early childhood education, with no gender-differentiated data. Considering the data for 2008 and 2018, progress in every variable and territory can be established, both in aggregate and for men and women separately. On the other hand, we can determine the scarcity levels in all the variables for 2018, obtaining a picture of educational poverty in that year.

The information used comes from official administrative records published in "Las cifras de la Educación en España" (Ministry of Education and Vocational Training, 2020), except for data assessing Mathematics and Science competencies in 2018, which come from PISA results (OECD, 2020).

Results

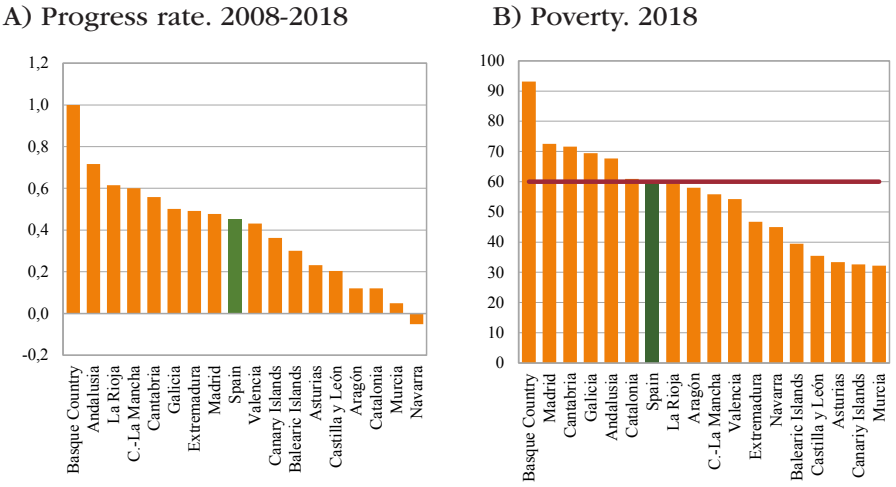
Early schooling

While there is some debate about when schooling should start (Becker & Schober, 2017), universal access to quality pre-primary education stands out among the SDGs. This paper considers enrolment rates at age two as a proxy for early education.

In Spain, the enrolment rate at the age of 2 was 35% in 2008 and only the Basque Country had a rate of 90%. The situation was particularly worrying in the Canary Islands, Castilla-La Mancha, and Extremadura (below 5%). A comparison of the 2008 and 2018 data shows that, in 2018, the school enrolment rate in the country was 60%, a significant advance but still falling far short of the 90% target. The only region that continued to meet the target was the Basque Country, but all except Navarra have made progress in this period.

On the other hand, most of the communities in 2018 are below this threshold (Figure 1) in this variable, where the poverty threshold is at 60%, except for Andalusia, Cantabria, Catalonia, Galicia, Madrid, and the Basque Country.

FIGURE I. Progress and poverty index. School enrolment rate of the 2-year-old population. Autonomous Communities. Academic years 2007/08 and 2017/18



Source: Ministry of Education and Vocational Training (2020) and own elaboration.

Suitability rates at 12 and 15 years of age

Suitability rates at each age show the percentage of pupils making adequate progress during compulsory schooling and completing the corresponding grade at the target age. A systemic problem in Spain has been grade repetition, which stands at over 30% (Choi et al., 2018). Thus, the suitability rates in Spain have consistently been the worst among OECD countries (Cabrera et al., 2019). This section considers suitability rates at the end of primary school (age 12) and in the last year of ESO (age 15).

Given the target is 95% at the age of 12 and 90% at the age of 15, Spain deeply undermeets these targets. At the age of 12, Spain has gone from 83.6% to 86.5%, and at the age of 15, from 57.7% to 69.4%. No region has reached the target, but practically all of them have made progress in the period analysed (Figures II and III), although it is relevant to note the increase in the flexibility of education policies in terms of grade repetition (LOE, 2006; LOMCE, 2013 and LOMLOE, 2020).Only

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Andalusia, the Balearic Islands, Asturias, and the Canary Islands out of the Autonomous Communities with the worst data in 2008 progressed above the national average.

In terms of progress in suitability rates at the age of 15, only Asturias and Castilla y León, starting from worse data than the national average in 2008, have progressed above average.

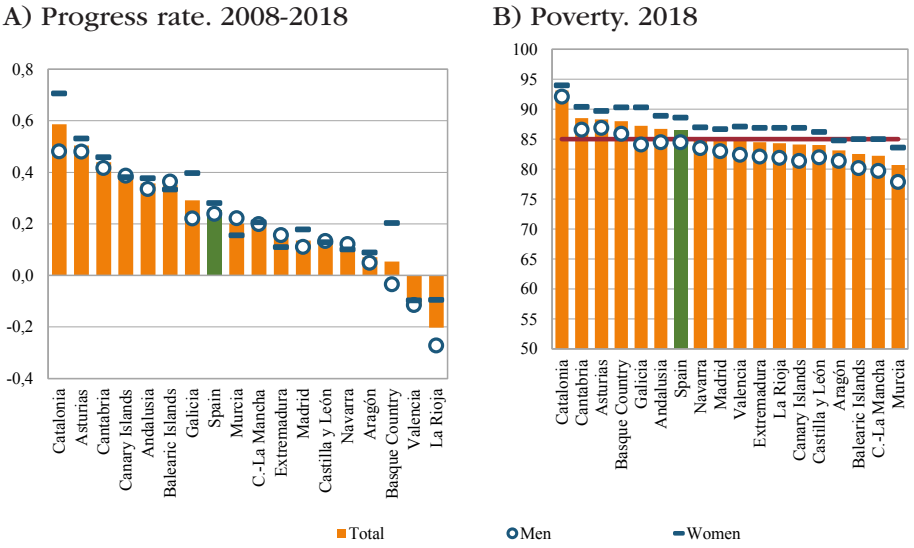
At the age of 12, a recurrent phenomenon begins to be detected: when disaggregating the data by gender, girls have, from the outset, performed better than their male peers. At 12 years of age in 2008, girls were 5 points on average ahead of boys, with an advantage of more than 8 points in the Canary Islands, Murcia, and the Balearic Islands. In 2018, girls' advantage was 4.1 points on average, with Galicia, the Canary Islands, Murcia, and Castilla-La Mancha above 5.3.

As regards suitability rates at 15, the girls' advantage on average was 11 points in 2008, with Galicia, Extremadura, the Canary Islands, the Balearic Islands, and Castilla-La Mancha above 12.3 points. In 2018, the difference in favour of girls was 8.8 points, with girls in the Balearic Islands, Cantabria, the Canary Islands, and the Valencian Community more than 10 points ahead of boys.

Women has also progressed more than men, except in Murcia and Extremadura at age 12, and in Galicia, La Rioja and Castilla-La Mancha at age 15.

In terms of poverty, while only Aragon and Murcia show poverty at age 12 for females, the situation is much worse for males at both ages, and both sexes at age 15, with only Catalonia and the Basque Country showing no poverty in these variables.

FIGURE II. Progress and poverty index. Suitability rate at age 12. Autonomous Communities. Academic years 2007/08 and 2017/18



Source: Ministry of Education and Vocational Training (2020) and own elaboration.

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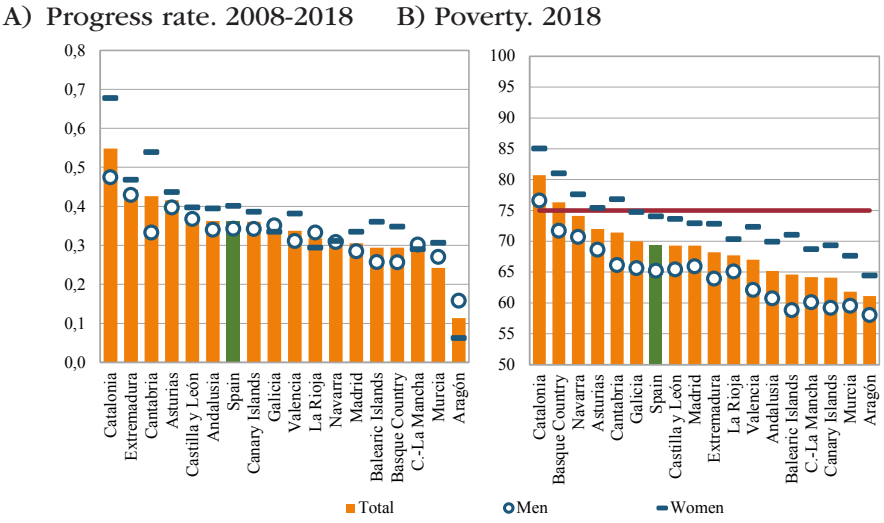
FIGURE III. Progress and poverty index. Suitability rates at age 15. Autonomous Communities. The academic year 2007/08 and 2017/18



Source: Ministry of Education and Vocational Training (2020) and own elaboration.

The PISA 2018 reports

At this point, it is important to determine whether the suitability rates adequately reflect the quality of education received by students, so we complete the picture of the shortfall situation in 2018 with the results of the PISA tests in the 2018 wave in both Mathematics and Science.

The PISA programme considers low performers to be students whose scores are below level 2 of the 7 levels into which PISA classifies student performance. In this regard, it is interesting to note that some authors identify this situation with school failure (Choi & Calero, 2013).

In Mathematics (Figure IV), the situation in Spain in 2018 is worrying, with 24.7% of students scoring low. The Canary Islands, Andalusia, Murcia, and Extremadura stand out for having the highest percentages, both in males and females. However, unlike the rest of the variables analysed, men obtain better results here than women, with an average

difference of 0.3 percentage points in favour of men, as is the case in general (Ó Siochrú, 2018).

In Science, the situation is similar, although less accentuated, as 21.3% of students in Spain are in the low-performance levels. Nevertheless, on average, the advantage is in favour of females by one percentage point. However, not all regions show a smaller percentage of low women achievers: in the Balearic Islands, the Canary Islands, Cantabria, Castilla-La Mancha, La Rioja, and Madrid, the results of men are better than those of women. The communities with the worst outcomes are the same as those in Mathematics.

While these results are partly in line with the 15-year-old proficiency rates, the picture they present has relevant differences. Aragon poses a significant case, with the worst results in proficiency rates at age 15, but good PISA results in both subjects.

To set the poverty thresholds from the PISA data, we considered the percentage average of low-performing students in the European Union to correspond to 22% in Mathematics and 21% in Science. Under this criterion, nine regions stand out for not showing poverty either in Mathematics or Science: Catalonia, Aragon, La Rioja, the Basque Country, Navarra, Cantabria, Asturias, Castilla y Leon, and Galicia. On the other hand, in Science, Madrid, Castilla-La Mancha, and the Balearic Islands would not be below the poverty line either. In contrast, Andalusia, the Canary Islands, Extremadura, the Valencian Community, and Murcia are below the poverty line in PISA in both subjects, as well as in proficiency rates at age 15.

In the analysis of the results differentiated by gender, the Canary Islands, Andalusia, Extremadura, Murcia, Castilla-La Mancha, and the Valencian Community show poverty among males and females in both subjects. On the other hand, Catalonia presents male poverty in both areas whereas the Balearic Islands show female poverty in both disciplines. In addition, the Basque Country shows poverty for males in Mathematics.

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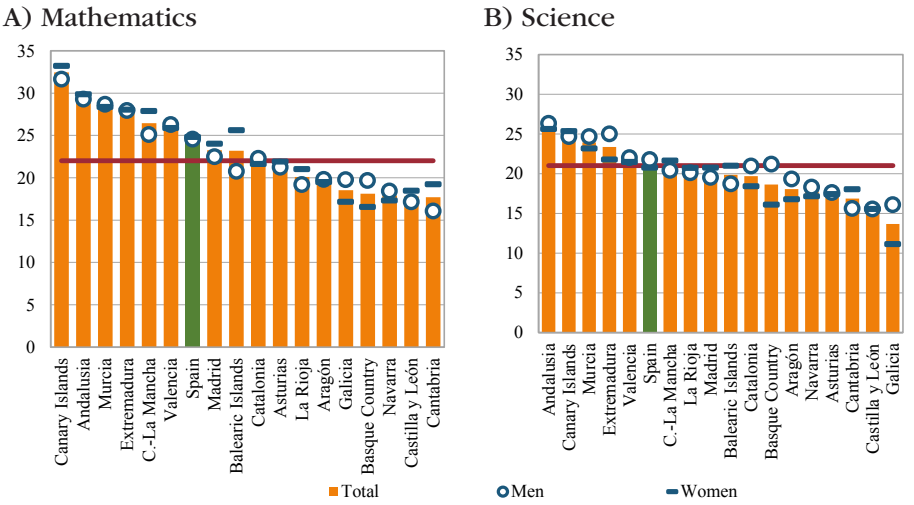
FIGURE IV. Poverty. Low performance in PISA. Autonomous Communities 2018.



Source: OECD (2020) and own elaboration.

School failure

As mentioned above, there are several options for analysing school failure (García, 2017). In this section, we opt for a standard version of the term school failure, the so-called administrative school failure, understood as a situation in which the student attempts to achieve the minimum objectives set by the institution - those of compulsory secondary education - and withdraws without having achieved them.

School failure in Spain is at very high levels, although it is true that it has fallen in the last 10 years, from 30.6% in 2008 to 22.2% in 2018. The differences between men and women are more than 10 percentage points, with men showing a clear disadvantage.

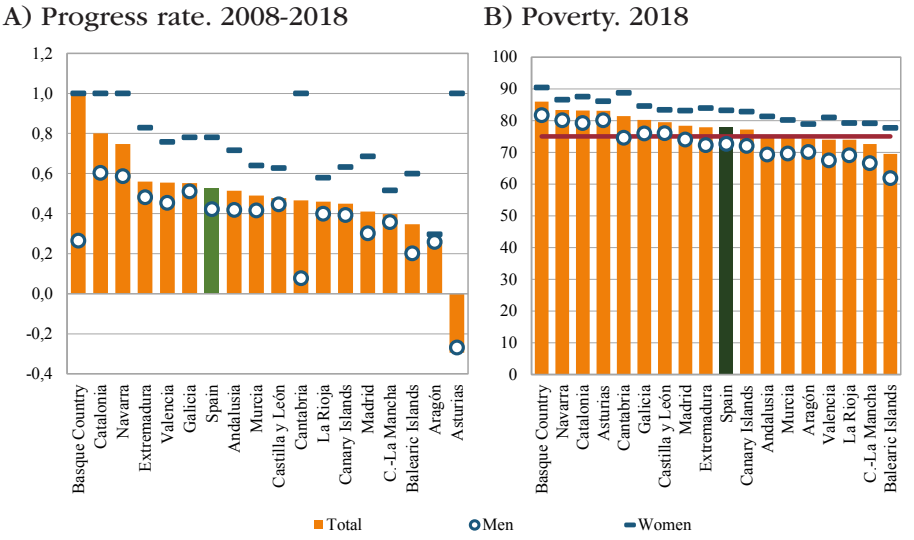
The Ministry of Education and Vocational Training provides data on *the gross rate of the population completing ESO*, which measures the population completing compulsory education. We here consider this variable complementary as a proxy for school failure. The threshold to be reached in 2020 was set at 85.3%, in line with the 2020 Strategy objectives, to calculate this indicator's progress rate. Although all the

Communities, except Asturias, are making progress in this variable (Figure V), it is worth noting that, only the Valencian Community and Extremadura out of the Communities that started with the worst values in 2008 are making above-average progress in this variable, and beta convergence is therefore very weak.

One of the messages standing out again is the difference between men and women. Women show better values in this indicator than men in all regions. Furthermore, women reached the target value in five regions, four of which belong to the Cantabrian coast, unlike men in any other Spanish community in 2018.

In terms of poverty, with a threshold of 75% of pupils completing ESO, the Balearic Islands, Castilla-La Mancha, and La Rioja are below the threshold for the general population. While no region has female poverty in this variable, in the case of males, only Asturias, Cantabria, Castilla y Leon, Catalonia, Galicia, the Basque Country, and Navarra are free of poverty in this variable.

FIGURE V. Progress and poverty index. Gross rate of the population completing ESO by sex. Autonomous Communities. Academic year 2007/08 and 2017/18



Source: Ministry of Education and Vocational Training (2020) and own elaboration.

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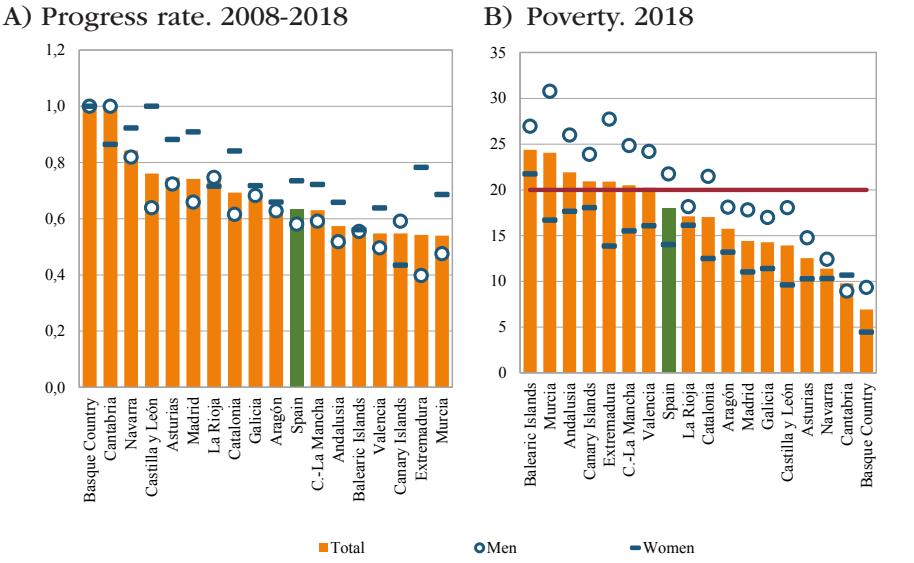
Early school dropout

The early school leaving rate (ESL) summarizes the consequences of the educational problems discussed above, since enrolment rates at age 2, suitability rates at ages 12 and 15, and school failure directly affect the ESL.

To calculate the ESL progress rate, we consider the 10% established by the European Union as the ET2020 as the threshold target to reach. It is noteworthy that all Spanish regions have experienced progress. And some, such as the Basque Country and Cantabria, managed to fulfil the target.

Once again, women showed a comparative advantage over men (Figure VI), with a higher rate of progress except in Cantabria, La Rioja, and the Canary Islands. Men only progressed above the national average in Catalonia and Extremadura, among the worst-placed regions in 2008. On the other hand, the regions with the highest rate of progress for the general population are the Basque Country, Cantabria, Navarra, Castilla y Leon, Asturias, and Madrid, which have the lowest ESL rates. This shows the absence of beta convergence between the Spanish regions for this variable.

FIGURE VI. Progress and poverty index. Early school leavers. Autonomous Communities. 2008-2018



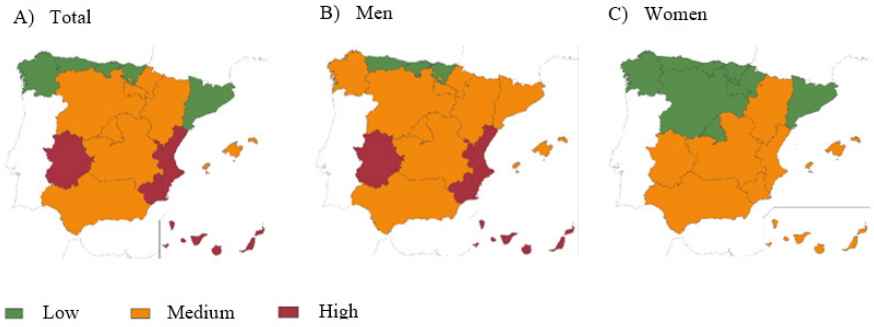
Source: INE and own elaboration.

The poverty results for this variable partly coincide with poverty in school failure but are more intense. All regions showing poverty in school failure also show dropout poverty, both in the general case and by gender, although females, except in the Balearic Islands, do not show poverty. In the case of males, poverty dropout figures are more widespread across regions and show a strong correlation with school failure.

Summary results

Figures VII and VIII show a summary of the geographical situation of educational poverty in 2018 and educational progress between 2008 and 2018, distinguishing between communities with extreme educational poverty (6-7 variables in which the community is poor), medium poverty (3-4-5 variables in which poverty appears), or without educational poverty (0-1-2 variables in which poverty appears). When representing progress, we differentiate communities between strong progress (4-5 variables where the community progresses above the national average), moderate progress (2- 3 variables of progress above average), and weak progress (0-1 variables of progress above average).

FIGURE VII. Educational poverty index. Autonomous regions. 2018



Source: Ministry of Education and Vocational Training (2020), INE, OECD (2020) and own elaboration.

FIGURE VIII. Educational progress index. Autonomous regions. 2008-2018

Source: Ministry of Education and Vocational Training (2020), INE, OECD (2020) and own elaboration

We can observe a very well-defined territorial distribution. Catalonia and the communities of the Cantabrian coast show little poverty and strong progress; in contrast, the Canary Islands, Murcia, and the Valencian Community show extreme poverty and weak progress. Extremadura starts from extreme poverty but shows medium progress. The situation of men is worse than that of women in terms of poverty, but men make more progress in almost all regions.

Discussion

This paper has presented a territorial overview of the situation of compulsory education in Spain and incorporated two novel methodological aspects. On the one hand, the concept of educational progress was included and analyses the trajectories of the different communities between 2008 and 2018. On the other hand, the notion of educational poverty was introduced and highlights the regions that suffer significant shortcomings in compulsory education. The substantial differences between women and men have highlighted the desirability of considering the gender perspective.

In terms of educational progress, it is noticeable that all the regions have made progress in the period but the signs of beta convergence are weak. This implies that the progress speed of the worst-placed regions

is not enough to achieve a certain uniformity in the long run, which is consistent with other studies (De la Fuente & Domenech, 2021). Of particular concern is the situation in Murcia, the Valencian Community, Castilla-La Mancha, Aragón, the Canary Islands, and the Balearic Islands, which, relative to the general population, show weak progress. These same regions (except Castilla-La Mancha, Aragon, and the Balearic Islands) plus Extremadura (with medium progress) show extreme poverty in 2018.

In 2008, the data for Andalusia, Extremadura, the Balearic Islands, Castilla-La Mancha, and Murcia was worse than the national average in all the variables considered. The Canary Islands, the Valencian Community, and La Rioja performed under the Spanish average in four variables. Cantabria, Aragon, and Asturias qualified poorly in two of the variables. In 2018, the situation in La Rioja, Cantabria, Aragon, and Asturias was good, while the outcome of the rest continued to be precarious. This indicates that not only the economic conditions of the communities can explain educational outcomes (García & Valls, 2018). In many cases, the territories' productive conditions may have a negative influence on their educational outcomes, as in the Canary Islands and the Mediterranean regions (Oliver & Roselló, 2019).

The apparent inconsistencies between the PISA results and the proficiency rates may be due to the lack of regional representativeness of PISA. Or otherwise, to methodological or implementation problems that, for example, have made it unfeasible to use the reading data in the Spanish case. It is noteworthy that, as in other waves, the proficiency rates at age 15 are, for all regions, worse than the percentages of students not classified as low achievers according to PISA (García, 2017). This indicates that school failure in Spain may not respond to a lack of knowledge, or a consequence of the numerous methodological problems presented by the PISA programme (Fernández-Cano, 2016).

In terms of gender, consistent with other studies, females perform better than males in all variables except PISA Mathematics (Fuentes & Renobell, 2020). In particular, early school leaving is shown to be a male phenomenon (Fernández & Calero 2014; Serrano et al., 2014; Soler et al., 2021), extensible to the foreign population. Although the divergences described above may be due to multiple and complex factors, overcoming the still socially prevalent gender role differences acts as an incentive for women's educational efforts (Martínez García, 2021).

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In addition, the educational level of parents, especially the mother, and the economic capacity of families have a direct impact on this phenomenon (Bayón et al., 2017). The likelihood of early dropout falls the better educated the parents are.

The above results indicate a high correlation between the different variables chosen to analyse educational progress and poverty, as has already been seen in other studies (García, 2017). The factors that explain these failures can be classified into those relating to students' socioeconomic and family situation, personal characteristics, regional characteristics, or educational trajectory.

The previous analysis allows us to suggest some educational policy measures already discussed in other studies that may help improve the situation. Women have better academic results than men (except in Mathematics) but greater labour market insertion problems (Dancausa et al., 2021). Lawmakers therefore should implement intervention policies from a gender perspective to minimize stereotype effects (Garrido et al., 2020).

An important issue relates to the particular difficulties of every region, which should include specific plans to avoid the risk of educational failure (taken in its broad sense). For example, to tackle inequality and discrimination, incorporating early education in the public or subsidized systems, or allocating special resources for students from more disadvantaged backgrounds (Rosado & Cáceres, 2018; García & Jiménez, 2019).

Some measures to prevent early failure can be effective, such as encouraging reading at an early age or supporting children born in the third quarter of the year (Cabrera, 2019).

Grade repetition stands out as a negative factor: not only does it fail to improve the quality of the student's education, but it also increments school failure and has a stigmatizing effect that demotivates students (Cabrera, 2019; Cabrera et al., 2019; García & Jiménez, 2019).

The family environment is of the utmost importance for educational success. It is not enough to implement specific policies for the most disadvantaged families. Schools still need to be involved in this aspect, by providing material, reconciliation policies, and, above all, raising awareness among families so that they feel included in the educational process (Garrido et al., 2020).

Conclusions

This work has allowed a synthetic image of the situation of compulsory education in the Spanish Autonomous Communities, including a gender perspective, to be projected.

The concepts of educational progress and poverty provide a holistic view of the situation and evolution of the problems of compulsory education in Spain and its regions. All regions have shown progress in the variables considered over the period 2008-2018. However, convergence is weak, which indicates homogenization problems in the long term.

Regional differences in educational attainment show a map of educational poverty highly concentrated along the Mediterranean arc, except for Catalonia, as well as in the Canary Islands, Extremadura, and Castilla-La Mancha, where male predominance is high.

The temporal analysis shows that the economic situation is a determining factor in educational progress and poverty, although part of this situation of poverty can be explained by the concentration of production in the tourism sector in some regions. That mainly directs the underqualified male young population to a dynamic labour market, although exposed to fluctuations, as shown by the crisis caused by COVID-19.

Educational performance strongly relates to gender, possibly due to sociocultural aspects not yet overcome. In general (except for PISA results in mathematics proficiency), females perform better than males.

The families' socio-economic context is a relevant factor in the educational performance of the school-age population. To improve it, vulnerable families, along with the immigrant population, need special attention.

The design and implementation of education policies, aimed at achieving the highest degree of equality of opportunities, should focus on education at an early age, which is fundamental in improving educational outcomes later in life, especially for students from disadvantaged backgrounds.

Finally, although the presence of educational poverty does not exclusively depend on education investment and expenditure, it is worth noting that regions with higher levels of public expenditure per student and educational effort (relative to GDP per capita) also show better results. The Cantabrian coast regions, and Castilla y León, have a per capita

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income public expenditure per student, which is over twenty percent higher than the national average in 2018, revealing the importance they devote to education. This extra-economic effort rewards higher quality educational results.

This study, however, has some limitations. In the 2018 PISA wave, reading literacy data are unavailable for Spain and its regions. Moreover, regionally disaggregated data is not available for all communities for the pre-2105 waves. In any case, the procedure used yields valid and relevant results.

In future work, we envisage the possibility of replicating the study in other countries, along with extending the concepts of poverty and educational progress to further education levels in Spain.

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Interventions to improve reading competence: a systematic review

Intervenciones realizadas para mejorar la competencia lectora: una revisión sistemática

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Abstract

Numerous studies have evaluated intervention programmes for the development of reading competence in primary education (PE). This paper aims to carry out a rigorous systematic review to analyse the complex spectrum of interventions to improve reading competence in PE students. This systematic review has been conducted following the PRISMA statement (Page et al., 2021). Inclusion criteria for the selection of interventions were the following: (1) interventions that were curricular in nature, (2) interventions that improved reading competence and (3) interventions in primary school settings. The article selection process was carried out in 4 stages, and a total of 31 articles were identified and analysed using Atlas.ti (version 9.02). The main results include the descriptive indicators of the articles reviewed and others related to the content of the studies. The following characteristics were identified regarding the interventions: (1) they were remedial,

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(2) they targeted students in disadvantaged situations, and (3) they focused on the executive functions. The analysis therefore found and classified educational trends in the development of reading competence. The results obtained benefit the educational community and may serve to guide future teaching actions, as they pointed out those elements referring to specific reading competences and skills, types of activities and didactic resources. In conclusion, the study invites the educational community to strengthen the weaker aspects associated with the more traditional trends in the teaching of reading and to continue to persevere with the more innovative aspects. This research did not receive any external funding.

Keywords: Reading, Reading Comprehension, Educational Intervention, Teaching Programmes, Basic Education.

Resumen

Actualmente, existen numerosos estudios en los que se implementan y evalúan programas de intervención para el desarrollo la competencia lectora en educación primaria (EP). En este contexto, este trabajo tiene como objetivo realizar una rigurosa revisión sistemática para analizar el complejo espectro de las intervenciones realizadas para mejorar la competencia lectora en el alumnado de EP. Específicamente, esta revisión sistemática se ha realizado siguiendo la declaración PRISMA (Page et al., 2021). Los criterios de inclusión recogen intervenciones: (1) curriculares, (2) que mejoran la competencia lectora y (3) sobre estudiantes de EP. El proceso de selección de los artículos se desarrolló en 4 etapas, y se identificaron un total de 31 artículos, analizados con Atlas.ti (versión 9.02). Entre los principales resultados, destacamos indicadores de tipo descriptivo de los artículos revisados, así como también otros relacionados con el contenido de los estudios. Esto nos ha permitido descubrir las siguientes características de las intervenciones analizadas: (1) tienen un carácter remedial, (2) están dirigidas a estudiantes en situaciones desfavorecidas, y (3) se enfocan en el nivel ejecutivo. Así, el análisis realizado ha permitido determinar y clasificar las tendencias educativas en el desarrollo de la competencia lectora. Los resultados obtenidos en este trabajo benefician a la comunidad educativa y, además, permiten orientar la futura acción docente, señalando aquellos elementos referidos a las competencias y habilidades lectoras específicas, tipos de actividades y recursos didácticos. En conclusión, el estudio invita a la comunidad educativa a reforzar los aspectos más débiles asociados a las tendencias más tradicionales de la enseñanza de la lectura y a seguir perseverando los aspectos más innovadores. Esta investigación no recibió ninguna financiación externa.

Palabras claves: Lectura, Competencia lectora, Intervención educativa, Programas de Enseñanza, Educación Básica.

Introduction

One of the concerns in primary education (PE) is how to help students develop reading competence to meet both school and social demands (Jones et al., 2018). Research has shown that school success is based on reading achievement (Brigman et al., 2018). Thus, reading difficulties (RDs) that are not addressed educationally may be a predictor of school failure (Reid, 2016). In turn, this failure is highly correlated with problems in students' personal and social lives (Gholami et al., 2016).

Reading competence is based on several axes: learning to read, reading to learn in any academic environment or in everyday life, and learning to enjoy reading (Solé, 2004). Wells (1986) and Freebody and Luke (1990) proposed that this competence can be achieved at four levels. The first is the executive level, which involves knowing and using the written code. The second is the functional level, which entails meeting the challenges of everyday life. The third is the instrumental level, which makes it possible to search for information and have access to knowledge. Finally, the fourth is the epistemic level, which involves thinking and contrasting knowledge in order to use it creatively.

RDs are a recurrent issue in PE classrooms (Bowyer-Crane et al., 2008). RDs can be defined as those barriers that affect the development of skills which contribute to reading comprehension (Cain, 2010). Specifically, RDs emerge when precursor skills such as decoding, or language comprehension are poorly developed (Camarillo, Silva and Romero, 2021). Some research has shown that these difficulties can be prevented through planned interventions (Gholami et al., 2016). Therefore, systematic and quality interventions are needed to help foster the development of reading competence, as well as to reduce the difficulties that students may have in learning to read (Levin & Baratz, 2019).

In recent decades there has been an increase in the number of studies that have investigated what type of intervention should be carried out to improve the reading competence of children in PE (Hernández-Valle & Jiménez, 2001). The preference of one method over another is very important because, according to some research, the type of instruction used to read in initial learning influences the strategies that learners use in word recognition and reading (Connelly et al., 2009).

There is also a bidirectional relationship between the development of phonological awareness (PA) and reading (Novianti et al., 2019). Several studies have shown how interventions that include metalinguistic skills training improve reading readiness (Ball & Blachman, 1991).

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There are numerous studies that have evaluated or described intervention programmes to develop reading competence in PE (Akyol & Boyaci-Altinay, 2019; Dowrick et al., 2006). However, there are no systematic reviews that have analysed and brought together all the interventions and programmes that have been implemented to date to improve reading competence in PE. Nor is there a framework to help educators classify them according to the profile, metalinguistic ability, or level of reading competence being developed.

This systematic review starts from the premise that there is no single strategy to meet the different learning styles and needs in reading. In addition, there is a need to provide interventions, criteria and tools to help teachers make the learning pathway engaging, along with various reading resources and strategies (Ghanaat et al., 2017; Hwang et al., 2019; Müller et al., 2015).

The objective of this paper is to carry out a rigorous systematic review and analyse the complex spectrum of interventions available to improve reading competence in PE students.

Methodology

This systematic review was conducted in accordance with the PRISMA statement (PRISMA 2020, Preferred Reporting Items for Systematic Reviews and Meta-Analyses) (Page et al. 2021). The formulation of the research question, the search strategy, and the inclusion and exclusion criteria followed the PRISMA statement (Page et al., 2021). In addition, the study by Lockwood et al. (2015) was used as a basis for drawing together and interpreting the findings of the included studies. The transparency, validity and replicability of the study was ensured by using the list of 11 generic criteria to assess quality included in the appraisal checklist for systematic reviews developed by the Johanna Briggs' Institute (2017).

Research question

The PICO strategy established by the National Institute for Health and Care Excellence (Schardt et al., 2007) was followed in order to establish the research question that guided this systematic review. The acronym PICO

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consists of the terms population (P); intervention (I); comparison, control or comparator (C); and outcome (O). Accordingly, the research question posed is as follows: What interventions (Is) have been implemented to improve the reading competence (O) of PE students (P)?

Search strategy

The search for studies was carried out in March 2021 using the Scopus, ERIC, and Web of Science (WoS) core collection databases. Only journal articles published between 1996 and 2021 were searched, and book chapters, reports or conference proceedings were not included. Studies were identified through a systematic search of keywords designed using the PICO strategy (Table 1).

TABLE 1. Keywords formulated using the PICO strategy

	[1] **Population**	[2] **Intervention**	[3] **Outcomes**
Keywords	"primary school*" OR "primary grad*" OR "primary education*" OR "elementary school" OR "elementary education""	"reading method*" OR "reading intervention*" OR "reading implementation*" OR "reading practice*	"reading abilit*" OR "reading competence*" OR "reading skills" OR "reading capacit*".
Searches	**In Scopus:** TITLE/ABS/KEY [1] AND TITLE/ABS/KEY [2] AND TITLE/ABS/KEY [3] **In WoS:** TOPIC [1] AND TOPIC [2] AND TOPIC [3]. **In ERIC:** ABSTRACT [1] AND ABSTRACT [2] AND ABSTRACT [3].		

Source: Developed by the authors.

Inclusion and exclusion criteria

The PICO strategy (Methley et al., 2014) was also used to design the inclusion and exclusion criteria of the studies in a comprehensive, unbiased manner (Table 2). Articles with qualitative, quantitative and

mixed designs were selected, while literature review studies were excluded.

TABLE 2. Inclusion and exclusion criteria formulated using the PICO strategy

	Population	Intervention	Outcomes
Inclusion criteria	PE students	(Curricular) reading intervention that details its procedure	Reporting on the development of reading skills, abilities or competence
Exclusion criteria	Students in early childhood and secondary education, baccalaureate, vocational education, university education and non-formal education.	Co-curricular or extracurricular intervention for writing or reading and writing literacy skills, with Chinese characters or calligraphy.	Reporting on the development of attitudes towards reading

Source: Developed by the authors.

Selection process

The study selection process underwent several stages and was carried out by the three researchers who were responsible for the study (Figure 1). A total of 777 studies were identified in the Scopus, WoS and ERIC databases in the first stage. Literature references were exported to Excel, thus eliminating duplicate documents (n=315). This yielded a total of 462 studies to be reviewed.

In accordance with the inclusion and exclusion criteria (Table 2), the 462 articles were title screened. This process resulted in 164 research studies being excluded, as they did not meet the inclusion criteria. The same process was then carried out in which the abstract of the 298 studies was reviewed and 161 were excluded. The outcome of this last stage was a total of 137 articles to be analysed.

During the screening stage, the three researchers independently reviewed the full text of these 137 papers and those that did not meet

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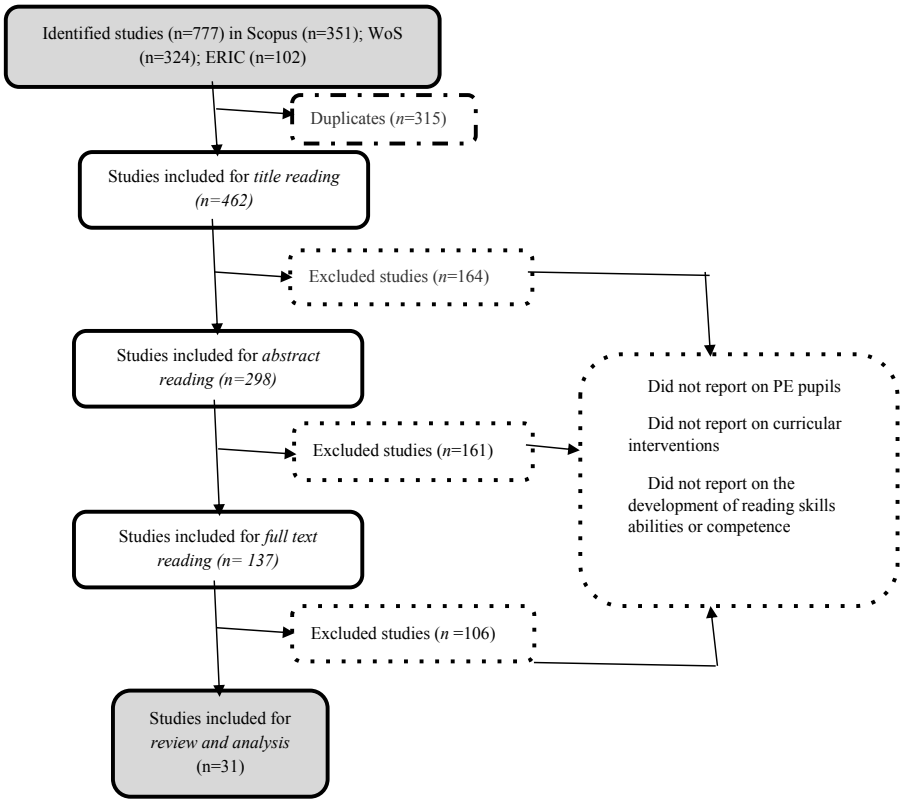
the criteria (n=106) were eliminated. The full process yielded a total of 31 articles for review and detailed reading.

FIGURE 1. Study selection procedure flow chart



Source: Developed by the authors.

Quality assessment

The quality of the studies was assessed by using the checklists of assessment criteria developed by CASP (2022). All the selected studies met these criteria.

Data analysis

In order to systematically organise the most important information from the selected studies, different variables were recorded and grouped into the following categories: intervention variables (reading competence, metalinguistic ability, type of activity, resource used), participant variables (country; school year; profile characteristics, taking into account advantaged, neutral and disadvantaged circumstances), context variables (PE schools and studies between 1996 and 2021), methodological variables (studies with qualitative, quantitative and mixed designs) and extrinsic variables (studies published in high-impact journals). To systematise and analyse the data, two complementary tools were used to systematise and analyse the data: Excel spreadsheets and Atlas ti (version 9.02).

Results

In order to define a frame of reference for the 31 interventions, the descriptive data of the studies analysed are presented below.

Descriptive analysis of the literature under study

Of the 31 articles analysed, 26 evaluated the effect of an intervention to improve the reading competence of different profiles of PE students, whereas 5 compared the effects of interventions for the development of specific reading skills.

The selected papers had been published in various journals. In total, 28 journals were identified, which were focused on education (14 out of 31), psychology (9 out of 31), linguistics (3 out of 31), computer applications (3 out of 31), and occupational therapy (1 out of 31). There was also a multidisciplinary journal.

Between 1996 and 2014, one article was identified each year that answered the research question posed and met all of the inclusion criteria. From 2014 onwards this trend increased, as can be seen in Chart 1. Taking into account that the search for studies was carried out in

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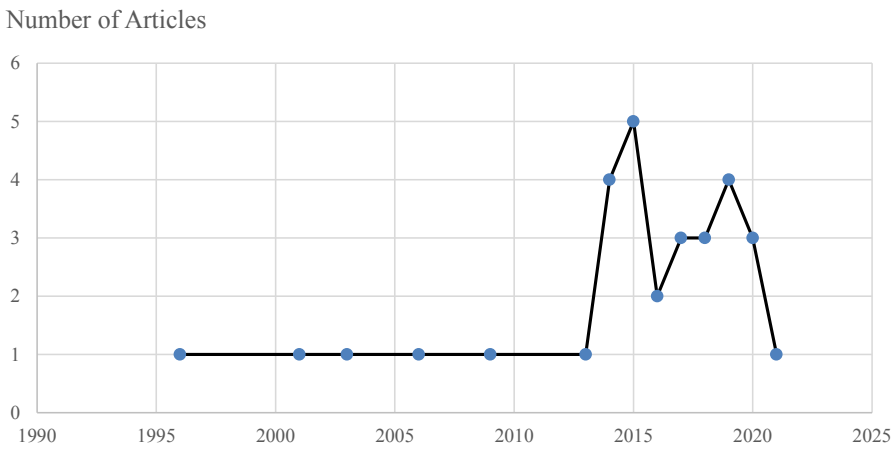
March 2021, it cannot be concluded that this trend will either continue or decrease from 2021 onwards.

CHART 1. Number of publications per year



Source: Developed by the authors.

Interventions were identified in 18 countries (Chart 2). Turkey was the country with the highest number of interventions (5 out of 31), followed by the United States (4 out of 31), Germany (3 out of 31), Indonesia (2 out of 31) and Spain (2 out of 31).

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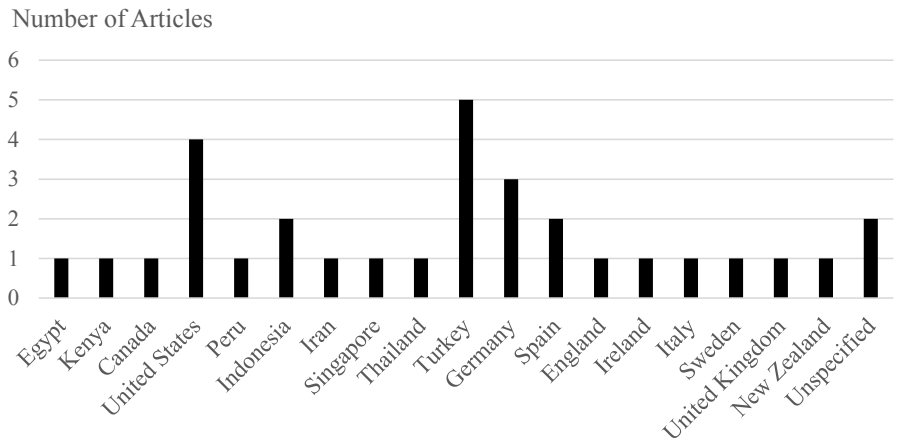
CHART 2. Number of publications per country



Source: Developed by the authors.

The objectives and general results of the 31 articles analysed are provided below (Table 3).

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TABLE 3. Objective and overall results of the selected studies.

Focus	Article		Overall results
Assessing and describing interventions	Abdulkader et al. (2009)	Quantitative	Improved comprehension and word recognition
	Arnaud & Gutman (2020)		Improved recognition and decoding
	Bowen & Yeomans (2002)		Reading support
	Di Giacomo et al. (2016)		Stimulated learning and improved silent reading and comprehension
	Ghanaat et al. (2017)		Improved reading skills
	Levlin & Nakeva (2020)		Improved word reading
	Müller et al. (2015)		Improved reading competence
	Müller et al. (2017)		Improved word recognition and fluency
	Regan et al. (2014)		Helped master decoding
	Abrami et al. (2016)	Mixed	Improved reading comprehension
	Akyol & Ketenoğlu (2018)		Improved reading comprehension and reading errors
	Archambault et al. (2018)		Improved reading fluency in English and French
	Griffin & Murtagh (2015)		Increased vocabulary, word recognition, accuracy, fluency and comprehension
	Hernández-Valle & Jiménez (2001)		Improved word recognition skills
	Li (2015)		Broadened vocabulary and increased interest in reading
	Maipoka & Soontornwipast (2021)		Improved vocabulary and reading comprehension
	Novianti et al. (2019)		Improved reading ability
	Robson et al. (2015)		Improved fluency skills
	Spencer (1996)		Improved reading performance through 'Mastery Learning'
	Thorne et al. (2013)		Improved vocabulary and reading comprehension of narrative texts
	Ulu & Akyol (2016)		Helped eliminate reading and comprehension errors
	Aşıkcan & Saban (2021)	Qualitative	Improved fluency
	Akyol & Boyaci-Altinay (2019)		Helped to read aloud and identify new sounds
	Dowrick et al. (2006)		Improved reading fluency
	Nurani & Mahendra (2019)		Helped to associate letters and images
	Yildirim et al. (2015)		Improved reading comprehension, automaticity and accuracy

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Comparing effects of interventions	Calet et al. (2017)	Quantitative	Improved prosody training, more than training in automaticity, speed, accuracy, prosody and reading comprehension
	Denton et al. (2014)		Explicit instruction fostered decoding, fluency and comprehension more than guided reading
	Gholami et al. (2016)		Phonetic, holistic and mixed methods reduced reading errors in irregular words
	Jones et al. (2018)		Direct instruction (DI) led to better results than computer-assisted instruction (CAI)
	Völlinger et al. (2018)	Mixed	Fluent and strategic reading had a positive effect on reading comprehension

Source: Developed by the authors.

Content analysis of studies

The results were outlined along six axes (Table 3): learner profile, specific reading competences, metalinguistic skills, types of activities and resources used.

TABLE 4. Summary of the content analysis of the studies

Article	Student profile	Acquisition level	Metalinguistic ability	Type of activities	Resource
Abdulkader et al. (2009)	RDs (Reading difficulties) Year 5 60 students	Executive Functional	Fluency, vocabulary, reasoning	Dual, Structural and Generative Mnemonics	Printed and games
Abrami et al. (2016)	Country with low literacy levels Year 2 429 students	Executive	Decoding, fluency, reasoning, memory	Language Modelling and Dual Mnemonics	Digital
Akyol & Ketenoğlu (2018)	Dyslexia; No cognitive, visual and auditory impairments Year 3 1 student	Executive	Decoding, fluency, vocabulary, memory	Language Modelling and Dual Mnemonics	Printed
Akyol & Boyaci-Altinay (2019)	Learning difficulties Year 4 1 student	Executive	Decoding, fluency	Language Modelling and Generative	Printed and games

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Archambault et al. (2019)	RDs Year 3 3 students	Executive	Decoding, fluency	Language Modelling	Printed
Arnaud & Gutman (2020)	Low socio-economic status; Low-level readers 1st and 2nd years 11 students	Functional Executive	Decoding, fluency, vocabulary, cohesion, reasoning, memory	Structural and Generative	Printed
Aşıkcan & Saban (2021)	RDs Low socio-economic status Year 3 27 students	Executive	Decoding, fluency	Generative	Printed and audiovisual
Bowen & Yeomans (2002)	Mainstream classroom 2nd, 3rd, 4th years 43 students	Executive	Decoding, fluency, vocabulary	Language Modelling and Dual Mnemonics	Digital
Calet et al. (2017)	Middle class 2nd and 4th years 122 students	Executive	Decoding, fluency	Language Modelling	Printed
Denton et al. (2014)	RDs; Low socio-economic status 1st and 2nd years 1942 students	Executive	Decoding, fluency, vocabulary	Language Modelling and Dual Mnemonics and Generative	Printed and manipulated
Di Giacomo et al. (2016)	RDs; high ability Year 4 144 students	Executive	Decoding, fluency, vocabulary, reasoning	Language Modelling and Dual Mnemonics and Generative	Digital
Dowrick et al. (2006)	RDs; risk of academic failure; family special needs Year 1 10 students	Executive	Decoding, fluency, vocabulary, reasoning	Language Modelling and Contextual Mnemonics	Printed, manipulated, games and audiovisual
Gholami et al. (2016)	RDs Year 2 12 students	Executive	Decoding	Language Modelling	Manipulated and printed
Griffin & Murtagh (2015)	Low-level readers 2nd, 3rd, 4th, 5th and 6th years 20 students	Executive	Decoding, fluency	Language Modelling and Dual Mnemonics	Printed
Hernández-Valle & Jiménez (2001)	Low-level readers Year 2 34 students	Executive	Decoding	Language Modelling	Manipulated

Jones et al. (2018)	Learning difficulties; L2; Mainstream classroom 1st, 2nd, 3rd, 4th, 5th and 6th years 321 students	Functional Executive	Decoding, fluency, vocabulary, cohesion, reasoning, memory	Dual Mnemonics, Contextual Mnemonics and Generative Mnemonics	Illustrations, manipulated and audiovisual
Levlin & Nakeva (2020)	RDs Year 1 267 students	Executive	Decoding	Language Modelling	Games and audiovisual
Li (2015)	Mainstream classroom Year 1 52 students	Functional Executive	Vocabulary, memory	Generative	Printed and digital
Maipoka & Soontornwipast (2021)	L2 Year 6 11 students	Functional Executive	Decoding, vocabulary, cohesion, reasoning	Language Modelling and Generative	Printed
Müller et al. (2015)	Mainstream classroom Year 4 265 students	Functional Executive	Decoding, fluency, vocabulary, cohesion, reasoning, memory	Contextual and Generative Mnemonics	Games
Müller et al. (2017)	RDs Year 2 75 students	Executive	Decoding	Language Modelling	Printed
Novianti et al. (2019)	RDs; Dyslexia 2nd, 3rd, 4th years 4 students	Executive	Decoding, fluency, vocabulary	Language Modelling	Printed and manipulated
Nurani & Mahendra (2019)	RDs Year 2 Not stated	Executive	Decoding, fluency	Language Modelling and Dual Mnemonics	Printed
Ghanaat et al. (2017)	RDs; Dyslexia Year 2 3 students	Executive	Decoding	Language Modelling and Generative	Digital, printed, games and audiovisual
Regan et al. (2014)	RDs 4th and 5th years 5 students	Executive	Decoding, fluency, vocabulary	Language Modelling and Generative	Digital
Robson et al. (2015)	Low socio-economic status 2nd, 3rd, 4th years 11 students	Executive	Decoding, fluency	Language Modelling	Digital
Spencer (1996)	RDs 1st and 5th year 4 students	Executive	Decoding	Language Modelling	Digital

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Thorne et al. (2013)	Low socio-economic status Year 5 88 students	Executive Functional	Decoding, vocabulary, reasoning	Language Modelling and Generative	Printed
Ulu & Akyol (2016)	RDs Year 3 1 student	Executive	Decoding, vocabulary	Language Modelling and Contextual Mnemonics	Printed
Völlinger et al. (2018)	Mainstream classroom Year 3 140 students	Executive	Decoding, vocabulary	Generative	Printed and manipulated
Yildirim et al. (2015)	Low socio-economic status Year 2 1 student	Executive	Decoding, vocabulary	Language Modelling	Printed

Source: Developed by the authors.

Profile of learners targeted by the interventions analysed

Of the 31 studies, 27 specified the schoolyears in which students were. As some of the interventions operated on more than one level, Table 5 shows a higher absolute frequency of characteristics (51) than the number of articles analysed (31).

TABLE 5. Schoolyear in which the interventions took place

Schoolyear	Absolute frequency	Relative frequency
Year 1	7	13.73
Year 2	15	29.41
Year 3	10	19.61
Year 4	10	19.61
Year 5	6	11.76
Year 6	3	5.88

Source: Developed by the authors.

The schoolyear that was most frequently considered for carrying out reading interventions was Year 2 (29.41%). This is likely to be the

case because the acquisition of reading skills has already started at this stage and therefore any difficulties students may have in developing their reading competence could begin to be identified. Year 3 and Year 4 students were also frequently considered (19.61%). The reason might be, firstly, that, if reading skills have not yet been acquired at these stages, it would be problematic; and secondly, that RDs would be detected in these age groups.

Following an affinity criterion, and based on an inductive analysis, Table 4 identifies three macro-categories made up of 13 different categories.

TABLE 6. Characteristics related to the student profile

Macro Category	Category	Absolute frequency	Relative frequency
Advantaged circumstances	High reading performance	1	2.38
	No apparent cognitive, visual and auditory problems	1	2.38
Total		2	4.76
Neutral circumstances	L2	2	4.76
	Mainstream classroom	5	11.90
	Middle class	1	2.38
Total		8	19.05
Disadvantaged circumstances	Reading difficulties	15	35.71
	Low-level readers	3	7.14
	Country with low literacy levels	1	2.38
	Dyslexia	3	7.14
	Learning difficulties	2	4.76
	Risk of academic failure	1	2.38
	Low socio-economic status	6	14.29
	Special needs due to family circumstances	1	2.38
Total		32	76.19

Source: Developed by the authors.

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As can be seen in Table 6, the vast majority of interventions were targeted at students living in disadvantaged circumstances (76.19%), while students living in advantaged circumstances were the least frequently considered in interventions (4.76%). In fact, the interventions that were focused on students living in advantageous circumstances did so in order to contrast their performance with learners living in disadvantageous circumstances (Di Giacomo et al., 2016).

For the 13 categories identified, the students most commonly included in reading interventions were those with RDs (35.71%). Therefore, the vast majority of the intervention proposals reviewed were carried out as a remedial strategy for reading difficulties. Thus, efforts were directed at trying to solve an existing problem, rather than implementing interventions that could help prevent it.

The profile targeted by the interventions corresponded to students with low socio-economic status (14.29%). This interest could be due to the influence of socio-economic status on academic performance and on students' cognitive development (Espinoza & Rosas, 2019). Studies have shown that students from socio-economically disadvantaged families develop their language skills more slowly and are at a higher risk of developing RDs (Urquijo et al., 2015). Thus, the acquisition of reading competence in these students makes it possible to compensate for the lack of cultural capital that students who are not economically disadvantaged receive from their families (Eyzaguirre & Fontaine, 2008).

Competences addressed in the interventions

In 24 of the 31 interventions reviewed there was a predominance of the executive level, while skills related to the executive and functional levels were the focus of 7 of them. This involved a tendency to interventions aimed at strengthening skills fundamentally related to mastering the translation of messages from the oral to the written code and vice versa (Monje Margelí, 1993). Only in a very small number of papers was functional acquisition developed, the command of which involves not only the interpretation of the code, but also the ability to transfer reading skills to the everyday needs of social life (Monje, 1993).

This tendency to promote the executive level could be regarded as logical taking into account that a large part of the interventions took

place in the first years of PE. However, this is distorted in the overall analysis, as the trend was maintained in the interventions carried out in Years 4, 5 and 6.

These data reveal an absence of interventions to develop skills at the instrumental and epistemic levels. In other words, in the proposals analysed, the aim was not for students to develop their ability to search for and record information, nor to use reading creatively and critically.

Metalinguistic skills developed in the interventions

Six levels of reading acquisition skills were identified, based on the activities carried out in the interventions (Table 7).

TABLE 7. Frequency with which metalinguistic skills were addressed in the interventions analysed.

Skill	Absolute frequency	Relative frequency
Decoding	29	34.52
Fluency	21	25.00
Vocabulary acquisition	16	19.05
Reasoning in reading comprehension	8	9.52
Working memory	6	7.14
Sentence construction and cohesion	4	4.76

Source: Developed by the authors

As can be seen in Table 7, the reading acquisition skill that was most frequently addressed was decoding (34.52%). This is possibly related to the fact that most of the interventions involved Year 1 and Year 2 students, the levels at which this recognition skill is most strongly focused on. Moreover, the predominance of this skill may lie in that it is the basis for progressing towards developing other skills.

Only 3 of the interventions included in the study aimed to develop all 6 reading comprehension skills. One might think that this would be because upper primary school students were included in these interventions.

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However, one of them was aimed at Year 1 and Year 2 students, one in Year 2, and one between Year 1 and Year 6. In contrast, there were also six interventions that focused on only one comprehension skill, which in all cases was decoding.

Types of teaching and learning activities

In the analysis of the 31 studies, 247 teaching and learning activities were identified and categorised into 5 types (Table 8).

TABLE 8. Types of teaching-learning activities identified

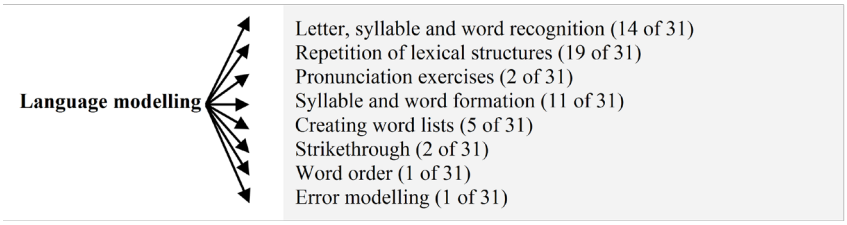
Activity Type	Absolute frequency	Relative frequency
Language Modelling	23	44.21
Generative	14	26.92
Dual Mnemonics	9	17.30
Contextual Mnemonics	4	7.69
Structural	2	3.84

Source: Developed by the authors.

17 of the 31 papers used different types of activities in their implementation, while 13 of the 31 used a specific one. A total of 10 papers were found with only language modelling activities, and 3 with generative activities.

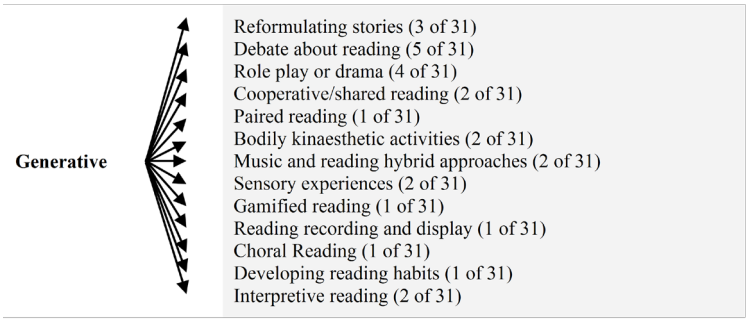
The most recurrent activities were language modelling activities, that is, procedures related to code mastery or normative linguistic aspects and related to the executive level of competence acquisition (Table 8). These activities were linked to pedagogical exercises of more traditional methods such as grammar or direct methods. They essentially featured two pedagogical mechanisms, repetition and trial-and-error (Figure 2). This predominance showed a strong tendency to use traditional, code-centred methods and analytical exercises (Marí et al., 2019).

FIGURE 2. Language modelling activities identified



Generative activities were the subject of 14 of the 31 papers analysed (Figure 3). The pedagogical aim of these exercises was the integration of new knowledge and the application of the contents addressed in other learning formats (Martín et al., 2008). Specifically, they are used in what has been called the communicative pedagogical approaches to language, which encourage the integration of disciplinary content and the development and the promotion of different generic competences (Villarroel & Bruna, 2014).

FIGURE 3. Generative activities identified



The strong presence of this type of activity in the interventions analysed may be due to the fact that, within the communicative approach,

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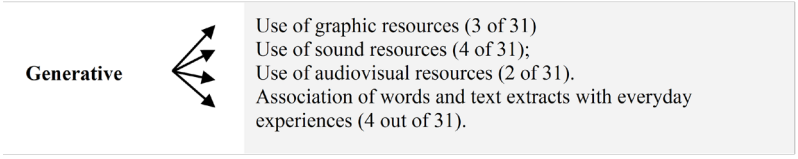
learning the code is an activity that seeks to encourage students to read (Tovar & Riobueno, 2018).

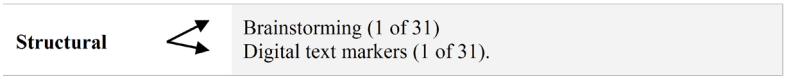
Mnemonic activities are those that enable learns to memorise and retain words and meanings through external resources. Two types of strategies were identified within these activities in the studies. Dual strategies, which involved sound, graphic or visual representations (9 out of 31); contextual strategies, which seek to promote retention and fixation of meanings through experiences close to everyday life (4 out of 31). The development of mnemonic activities (Figure 4) was of high pedagogical value, as it operated specifically as an indicator of reading performance and overall academic achievement (Guzmán et al., 2017).

FIGURE 4. Mnemonic activities identified



Finally, structural activities were also identified. These are activities that allow the student to develop cognitive strategies for encouraging writing. This typology was found in 6.4% of the studies analysed (2 out of 31). The following exercises were identified: brainstorming (1 out of 31) and digital text markers (1 out of 31).

FIGURE 5. Identified Structural Activities



Resources used in the interventions analysed

The analysis yielded a total of 79 teaching resources that were categorised into 5 typologies (Table 9).

TABLE 9: Types of resources identified in the interventions analysed.

Resource types	Absolute frequency	Relative frequency
Printed	21	45.68
Digital	8	17.02
Manipulated	7	14.89
Games	6	12.76
Audiovisual	5	10.63

Source: Developed by the authors.

The frequent use of printed resources could be explained by the fact that interventions were mainly carried out with disadvantaged students. In such cases, textbooks are provided free of charge by the Ministry of Education, and therefore these printed materials become the main didactic tool for teachers (Aguirre, 2015). It is also considered one of the most widely used resources to increase learning opportunities (Ibáñez et al., 2017). In addition, the use of printed and manipulated resources and of games have the advantage over digital and audiovisual resources that they do not require managing technological resources. These types of resources facilitate the work of those teachers who do not have the necessary skills to implement learning environments rich in digital or audiovisual resources.

Finally, the presence of digital resources as a mediation strategy for learning to read in PE could be due to the progressive incorporation of ICT in formal education systems. These technologies can be strategic actions that enable teachers to design activities that take into account students' different learning speed and potential. Therefore, the use of digital resources constitutes a strategy for the development of people's cognitive potential and, specifically, for the acquisition of reading skills (Mendoza, 2018).

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Conclusions

The objective of this rigorous systematic review was to analyse the complex spectrum of interventions that have been used to improve reading competence in PE students. A series of conclusions can be drawn from the 31 studies reviewed.

First, the interventions analysed were remedial in nature. The studies were mainly carried out in year groups where the difficulties in executive levels such as decoding and basic reading comprehension begin to become apparent. Moreover, students targeted in these interventions corresponded to profiles related to disadvantaged circumstances such as low socio-economic levels or learning difficulties.

These results show, on the one hand, that there is a lack of interventions aimed at promoting reading development in students who are not disadvantaged. On the other hand, they highlight the need for new pedagogical and didactic strategies to help reduce or prevent RDs. Thus, the implementation of reading promotion activities should start from the first year of primary school. In fact, considering the act of reading as a cognitive process, it is clear that learners should be encouraged to develop their own habits before starting to read a text. This would promote early identification of reading and text comprehension difficulties, enabling the transition to functional competence levels in later schoolyears.

Secondly, the studies analysed highlighted the executive nature of the interventions to improve reading competence. All the studies involved actions that enhanced executive skills, whereas only a relative few developed functional competence (skills). The remedial nature of the interventions makes it difficult to develop instrumental or epistemic aspects. This means that reading is largely characterised in these studies as a passive activity, which suggests that there is a need to develop competences that enhance generative, creative or critical reading abilities. The promotion of active methods and techniques can be a key element to do this. There is also a need to rethink reading habits and spaces. Reading exercises should be carried out on new terms that allow for reading experimentation, bringing reading themes closer to events or actions directly related to the students' daily life.

Thirdly, the interventions carried out to date have favoured metalinguistic skills related to traditional pedagogical schemes that promote learning structures based primarily on decoding or fluency

exercises. Again, this shows the need to structure didactic designs that enhance features of vocabulary acquisition, meaning construction, reasoning and working memory.

Fourthly, the most recurrent teaching-learning activities were those that proposed reading instruction on the basis of language modelling. Once again, the traditional paradigm of language teaching prevails; two activities play a major role within this paradigm: learning by repetition, and through trial and error. It seems clear that the more traditional didactic strategies of grammar teaching models and direct methods continue to have a strong influence on current interventions as well.

Although there was no evidence of activities that enhanced instrumental or epistemic competences, activity structures of a generative nature were emerging in some studies, especially in the most recent ones analysed. For example, under the influence of gamification methodologies or dialogic gatherings, new activity formats are appearing such as reading debates, story reconstruction or gamified reading. However, the pedagogical approach used in these activities is still based on a functional framework which privileges interpersonal communication, without allowing access to other knowledge or linking language and thought (instrumental and functional levels).

While this review has met its objective, some limitations can also be identified. Firstly, only articles written in Spanish and English were included, and therefore texts in other languages were excluded. In future publications, it would be desirable to extend the review. Secondly, the studies reviewed were extracted from journals indexed in the Scopus, ERIC and WoS databases. Consequently, further research could include other national and international databases that cover other genres.

In terms of the implications derived from the study, the systematic review carried out obtained an accurate picture of the literature on interventions for the development of reading skills. The study also has implications for pedagogy and teaching and learning processes. Some essential aspects for future teaching action have been pointed out, highlighting those elements referring to specific reading competences and skills, types of activities and didactic resources used for teaching reading practice in recent decades. This study has also identified trends in reading interventions, noting the need for further progress in reading practices. Specifically, a need has emerged to move towards an active

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and process-based approach to reading, which inherently involves the implementation of instrumental and functional structuring activities.

The research presented is an important step forward in the review of interventions that have been developed within reading competence internationally. It is therefore a detailed study of the interventions carried out and an immersion in the core characteristics of these educational actions: competences, skills, activities and resources used. The results can help the educational community to see how reading is currently developed in PE and are an invitation for the teaching community to strengthen the weaker aspects associated with the more traditional trends in teaching reading, while persevering in the more noteworthy aspects.

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Review

Review

Mainer Baqué, Juan. (2020). Consecrating the distinction, producing the difference: ahistory of the Secondary School of Huesca through its teachers (1845-1931). Huesca: Instituto de Estudios Altoaragoneses. 445 pp. ISBN: 978-84-8127-305-2.

This work by Juan Mainer develops a historical research about the current Ramón y Cajal Secondary School, former Provincial Secondary School of Huesca founded in 1845. A center closely linked to the development of the city of Huesca and considered essential for the maintenance and reproduction of the social and cultural order. Mainer allows us to explore the first eighty-five years of the school's existence through those who were its teachers with the mainpurpose of contributing to think of education as a social problem, something that he undoubtedly achieves. He does so by presenting three stories in one: that of the school, that of its teachers andthat of Huesca.

After a first block in which more general issues in relation to the secondary education, the decline of the University of Huesca and the beginning of the Provincial Secondary School are addressed, three more blocks that delve into the lives of nearly fifty teachers who served in the school are presented. This makes us reflect on the role of the school, its workers and the power conflicts that took place with internal and external actors. Organized chronologically and in relation to their historical context, the teachers are grouped into: Elizabethan teachers, Restoration teachers and Regenerationist teachers.

The Secondary School of Huesca in the traditional elitist educational mode (1845-1931) is thetitle of the first block. Necessary. It places us not only in the historical but also in the educationalcontext before immersing us in the lives of its main actors. It is key to understanding the beginning of secondary education, whose birth was inseparable from the end of the scholastic university and the establishment of the new traditional elitist model. It was in 1845 when one institution replaced the other in Huesca, an event that was considered a historical injustice and about which

Mainer offers a different historical approach, theoretically informed and which distances the Sertoriana from any iniquity.

The second section, *The Elizabethan Teachers, founders of the profession*, shows the difficulties in finding qualified teaching personnel at the time of the creation of the first schools. These teachers carried out their work in the first thirty years of the school and most of them entered the profession without facing the arduous public examination. They are a reflection of improvisation and the intrusion of different powers. We can highlight Julián Pérez Muro, key in the early years of the school, and Vicente Ventura Solana, indispensable to the understanding of its history.

The third section, *The Restoration Teachers: the consolidation of a socio-professional canon*, reflects the identifying features of a more stable body of teachers after the new legislation of 1857 and 1967 and with a more recognized academic level. López Bastarán, with more than thirty-five years leading the school, was the most charismatic director of the Restorationist period. During this period, there was a gradual stabilization of the teaching staff and a certain ideological change due to the incorporation of a younger group of teachers. The type of students did not change during these years, coming from the elite and the middle classes of the capital.

In *The Regenerationist Teachers, guarantors of the canon: tradition and modernization*, the fourth and last block, we find the authentic guardians of the professional canon. The baccalaureate continued to be the emblem of traditional elitist education and the professors its administrators. However, the first signs of crisis in this mode of education became apparent: the increase in enrollment, the incorporation of the first female students and the creation of new educational centers after 1928, which would destabilize the order of the body. These changes occurred in the second decade of the 20th century under the direction of Benigno Baratech, who also had to face the problem of vacant teaching positions.

In short, three stories connected with each other and in turn with Secondary Education during a key period in its development and that of its main actors. Great are the transformations that this book recounts and lasting the mark that these leave. As the author says, the echoes of the old Secondary Education still resound in today's secondary schools.

Álvaro Busnadiego Prieto

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